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TO THE RIGHT HONOURABLE

THE SECRETARY OF STATE FOR WAR.

SIR,

IN accordance with instructions laid down for the conduct of business by the Director-General and Heads of Branches of the Army Medical Department, I have the honour to submit the accompanying Report on the Health of the Army in 1866, and on various matters connected with the duties of the Officers of the Department.

I have the honour to be,

SIR,

Your most obedient

Humble Servant,

T. G. LOGAN,

Director-General.

ARMY MEDICAL DEPARTMENT,

July 1868.

TO THE DIRECTOR-GENERAL

OF THE

ARMY MEDICAL DEPARTMENT.

140470

SIR,

WE have the honour to submit the Report on the Health and Sanitary Condition of the Army for 1866. We have, with your approval, modified the arrangement of the present Report, with a view to facilitate reference, and to give, as far as practicable under each section of the Statistical Report proper, such observations as the Head of the Sanitary Branch was able to offer in explanation of the conditions under which the troops were placed, and which, it is reasonable to suppose, influenced materially the results embodied in the Statistics of the year.

It was hoped the Head of the Medical Branch would have been able to contribute a similar notice under each section of the Report, detailing briefly the systems of treatment pursued in the more serious forms and peculiar types of diseases, but the Reports received from Medical Officers deal so very sparingly with Therapeutics that it was found impracticable to do so this year.

We have incorporated in one general Appendix those Statistical Tables which could not be included with advantage in the text, as

well as such original contributions and extracts from Reports of Medical Officers on Sanitary and Medical subjects as have been considered of sufficient interest to justify publication.

We have the honour to be,

SIR,

Your most obedient humble Servants,

T. GRAHAM BALFOUR,
Deputy Inspector-General,
Head of Statistical Branch.

H. H. MASSY,
Deputy Inspector-General,
Head of Sanitary Branch.

THOMAS CRAWFORD,
Surgeon-Major,
Head of Medical Branch.

WHITEHALL YARD,
July 1868.

CONTENTS.

PAGE

Letter from the Director-General to the Secretary of State for War iii
Letter from the Heads of Branches to the Director-General v

REPORT.

I. On the Health of the Troops serving in the UNITED KINGDOM—
1. Sickness and Mortality 1
Admissions and Deaths by Classes of Diseases 2
" " at the different Groups of Stations .. 3
Remarks on the Prevalence of the principal Diseases at these .. 6
Prevalence of Venereal Diseases at each of the large Stations .. 7
Admissions, Deaths, and Invaliding from the different Arms of the Service 9
Deaths among the Soldiers placed upon the Pension List in 1866 .. 10
Admissions, Deaths, and Invaliding by Classes of Diseases in the different Arms 11
Remarks upon ditto 13
Admissions, Deaths, and Invaliding in each Corps 15
Re-Vaccination of Soldiers and Recruits 21
Aldershot: Sanitary State of 22
Western District, ditto 23
South-Western District, ditto 23
South-Eastern District, ditto 24
Chatham District, ditto 24
Woolwich Garrison, ditto 25
Northern District, ditto 25
Eastern District, ditto 26
North Britain, ditto 26
Ireland, ditto 27
Contagious Diseases Act, Report on 29
2. On the Extent of Invaliding 30
3. On the Number constantly Sick in Hospital 30
4. On the Influence of Age on the Mortality 31
5. On the Recruiting for the Army 32
Number of Recruits Inspected and Rejected 32
Proportion of Rejections in each of the Recruiting Districts .. 33
Native Countries of the Recruits Inspected 33
Number Inspected for each Arm of the Service 34
Causes of Rejection of Recruits found unfit 35
Age and Height of the Recruits 38
Weight of the Recruits Inspected at Head-Quarters of Districts 39
Extent of Education of Recruits Inspected at Head-Quarters of Districts, and at Regiments and Depôts 39
Previous Occupations of Recruits 40

II. On the Health of the Troops serving in the MEDITERRANEAN—
1. Sickness and Mortality 41
I. Gibraltar: Sickness and Mortality at 41
Admissions and Deaths by Classes of Diseases 42
Remarks on ditto 42
Sanitary State of the Command 43
II. Malta: Sickness and Mortality at 44
Admissions and Deaths by Classes of Diseases 45
Remarks on ditto 45
Royal Malta Fencible Artillery, Admissions and Deaths among, by Classes of Diseases 48
Sanitary State of the Command 49

PAGE

2. On the Extent of Invaliding among Troops serving in the Mediterranean 51
3. Mean Daily Sick of ditto 52
4. On the Influence of Age on the Mortality 52

III. On the Health of the Troops serving in British America—
1. Sickness and Mortality 53
I. Canada: Sickness and Mortality at 53
Admissions and Deaths by Classes of Diseases 54
Remarks on ditto 55
Sanitary State of the Command 55
II. Nova Scotia and New Brunswick: Sickness and Mortality in .. 57
Admissions and Deaths by Classes of Diseases 58
Remarks on ditto 59
III. Newfoundland: Sickness and Mortality in 59
Admissions and Deaths by Classes of Diseases 60
Sanitary State of the Troops in Nova Scotia, New Brunswick, and Newfoundland 60
IV. Bermuda: Sickness and Mortality in 61
Admissions and Deaths by Classes of Diseases 62
Remarks on ditto 63
Sanitary State of the Command 63
2. On the Extent of Invaliding among the Troops serving in British America 64
3. Mean Daily Sick 65
4. Influence of Age on the Mortality 66

IV. On the Health of the Troops serving in the West Indies—
1. Sickness and Mortality 67
I. Windward and Leeward Command: Sickness and Mortality of White Troops 67
Admissions and Deaths by Classes of Diseases 68
Remarks on ditto 68
Admissions and Deaths at the different Subordinate Stations .. 70
Remarks on Yellow Fever at Demerara 70
Sickness and Mortality of Black Troops 71
Admissions and Deaths at the different Subordinate Stations .. 73
Sanitary State of the Command 74
II. Jamaica: Sickness and Mortality of White Troops 74
Admissions and Deaths by Classes of Diseases 75
Remarks on ditto 76
Sickness and Mortality of Black Troops 76
Sanitary State of the Command 78
III. Bahamas: Sickness and Mortality of Black Troops 79
IV. Honduras: ditto, ditto 80
2. On the Extent of Invaliding among Troops serving in the West Indies and Western Africa 82
3. Mean Daily Sick 83

V. On the Health of the Troops serving in Western Africa—
Admissions and Deaths by Classes of Diseases at Sierra Leone, the Gambia, and the Gold Coast and Lagos 85
Remarks on ditto 87
Mean Daily Sick 88

VI. On the Health of the Troops serving at St. Helena—
1. Sickness and Mortality 88
Admissions and Deaths by Classes of Diseases 89
Remarks on ditto 89
2. On the Extent of Invaliding 90
3. Mean Daily Sick 91
4. Influence of Age on the Mortality 91

VII. On the Health of the Troops serving at the Cape of Good Hope—
1. Sickness and Mortality 91
Admissions and Deaths by Classes of Diseases 92
Remarks on ditto 93
Sanitary State of the Command 93
2. On the Extent of Invaliding 94

PAGE
3. Mean Daily Sick 94
4. Influence of Age on the Mortality 95
VIII. On the Health of the Troops serving in the MAURITIUS—
1. Sickness and Mortality 96
Admissions and Deaths by Classes of Diseases 97
Remarks on ditto 97
Sanitary State of the Command 98
2. On the Extent of Invaliding 99
3. Mean Daily Sick 100
4. Influence of Age on the Mortality 100
IX. On the Health of the Troops serving in CEYLON—
1. Sickness and Mortality of the White Troops 101
Admissions and Deaths by Classes of Diseases 101
Remarks on ditto 102
Sickness and Mortality of Black Troops 102
Admissions and Deaths by Classes of Diseases 103
Remarks on ditto 104
Sanitary State of the Command 104
2. On the Extent of Invaliding 105
3. Mean Daily Sick 105
4. Influence of Age on the Mortality 106
X. On the Health of the Troops in the AUSTRALASIAN COLONIES—
1. Sickness and Mortality 107
I. Australia and Tasmania: Sickness and Mortality in 107
Admissions and Deaths by Classes of Diseases 108
Remarks on ditto 108
Sanitary State of the Command 108
II. New Zealand: Sickness and Mortality in 109
Admissions and Deaths by Classes of Diseases 110
Remarks on ditto 111
Sanitary State of the Command 111
2. On the Extent of Invaliding 112
3. On the Mean Daily Sick 113
4. On the Influence of Age on the Mortality 114
XI. On the Health of the Troops serving in CHINA and JAPAN—
1. Sickness and Mortality 114
I. China, European Troops 114
Admissions and Deaths by Classes of Diseases 115
Remarks on ditto 116
Admissions and Deaths of Asiatic Troops 117
Remarks on ditto 118
Sanitary State of the Command 118
II. Japan, European Troops 119
Admissions and Deaths by Classes of Diseases 120
Remarks on ditto 120
Sanitary State of the Command 121
2. On the Extent of Invaliding from China and Japan 122
3. Mean Daily Sick 123
4. Influence of Age on the Mortality 124
XII. On the Health of the European Troops serving in INDIA—
1. Sickness and Mortality 125
I. Bengal: Admissions and Deaths by Classes of Diseases .. 126
Remarks on ditto 127
Admissions and Deaths at each Station 128
" " " by Classes of Diseases
in each of the Military Divisions 130
Sickness and Mortality in each Corps serving in the Presidency 136
Sanitary State of the Command 142
II. Madras: Admissions and Deaths by Classes of Diseases .. 147
Remarks on ditto 148
Admissions and Deaths by Classes of Diseases at each Group of Stations 150
Remarks on ditto 151
Sickness and Mortality in each Corps serving in Madras .. 155
Sanitary State of the Command 157

PAGE

III. Bombay: Admissions and Deaths by Classes of Diseases .. 164
Remarks on ditto 165
Admissions and Deaths by Classes of Diseases in each of the Military Divisions 167
Remarks on ditto 168
Sickness and Mortality in each Corps serving in Bombay .. 171
Sanitary State of the Command 174
2. On the Extent of Invaliding from India 177
3. Mean Daily Sick 179
4. Influence of Age on the Mortality 180

XIII. On the Health of Troops ON BOARD SHIP 181
1. Troops proceeding on Foreign Service 181
2. „ returning from ditto 183
3. „ passing from one Station to another 184
4. Invalids returning to England 184

XIV. Summary 184

APPENDIX.

No. I. Abstract showing the Admissions into Hospital, Deaths, and Invaliding among the Troops in the UNITED KINGDOM in 1866 188
No. II. Abstract showing the Number of Men belonging to the Regiments serving at home who were Vaccinated during the year 1866 198
No. III. Abstract showing the Ages of the Men serving in the different Arms at Home, and the Deaths at each Age in 1866 199
No. IV. Abstract showing the Number of Recruits Inspected, and the Number found unfit for Service in each of the Recruiting Districts during the year 1866 200
No. V. Abstract showing the Native Country of the Recruits Inspected at the Head-Quarters of each of the Districts during the year 1866 .. 200
No. VI. Abstract showing the Ages of the Recruits Inspected in 1866 .. 201
No. VII. Abstract showing the Heights of the Recruits Inspected in 1866 .. 201
No. VIII. Abstract showing the Weights of the Recruits Inspected in 1866 at the Head-Quarters of the Recruiting Districts 202
No. IX. Abstract showing the State of Education of the Recruits Inspected at the Head-Quarters of the Recruiting Districts, and at Regiments and Depôts in 1866.. 203
No. X. Abstract showing the Admissions into Hospital, and Deaths among the Troops serving in the MEDITERRANEAN 204
No. XI. Abstract showing the Diseases of the Men sent Home as Invalids from the Mediterranean, and of those finally Discharged the Service.. 209
No. XII. Abstract showing the Ages of the Troops in the Mediterranean and the Deaths at each Age 211
No. XIII. Abstract showing the Admissions into Hospital, and Deaths among the Troops serving in BRITISH AMERICA.. 212
No. XIV. Abstract showing the Diseases of the Men sent Home as Invalids from British America, and of Men Discharged the Service as Invalids in British America, and at Netley 217
No. XV. Abstract showing the Ages of the Troops serving in British America, and the Deaths at each Age 219
No. XVI. Abstract showing the Admissions into Hospital, and Deaths among the White Troops serving in the WINDWARD and LEEWARD COMMAND and JAMAICA 220
No. XVII. Abstract showing the Admissions into Hospital, and Deaths among the Black Troops serving in the Windward and Leeward Command, Jamaica, Honduras, and the Bahamas 226
No. XVIII. Abstract showing the Diseases of the Men sent Home as Invalids from the West Indies, and of those finally Discharged the Service at Netley; and the Diseases of the Black Troops Discharged as Invalids in the West Indies and Western Africa 229
No. XIX. Abstract showing the Admissions into Hospital, and Deaths among the Black Troops serving in WESTERN AFRICA 231

PAGE

No. XX. Abstract showing the Admissions into Hospital, and Deaths among the Troops serving at ST. HELENA, the CAPE OF GOOD HOPE, MAURITIUS, and CEYLON 234

No. XXI. Abstract showing the Diseases of the Men sent Home as Invalids from St. Helena, the Cape, Mauritius, and Ceylon, and of Invalids finally Discharged the Service in these Colonies, and in England 239

No. XXII. Abstract showing the Ages of the Troops at the Cape of Good Hope, and the Deaths at each Age, during the year 1866 241

No. XXIII. Abstract showing the Ages of the Troops serving at the Mauritius, and the Deaths at each Age, during the year 1866 242

No. XXIV. Abstract showing the Ages of the Troops serving in Ceylon, and the Deaths at each Age, during the year 1866 248

No. XXV. Abstract showing the Admissions into Hospital, and Deaths among the Troops serving in AUSTRALIA, NEW ZEALAND, CHINA, and JAPAN, during the year 1866 244

No. XXVI. Abstract showing the Diseases of the Men sent Home as Invalids from Australasia and China, and of those Discharged the Service as Invalids in Australasia and in England 249

No. XXVII. Abstract showing the Ages of the Troops in Australasia, and the Deaths at each Age in 1866 251

No. XXVIII. Abstract showing the Admissions into Hospital, and Deaths among Her Majesty's European Troops serving in BENGAL, MADRAS, and BOMBAY, during the year 1866 252

No. XXIX. Abstract showing the Diseases of the Men sent Home as Invalids from India, and of those finally Discharged the Service at Netley, during the year 1866 258

No. XXX. Abstract showing the Ages of the Troops serving in the Bengal, Madras, and Bombay Commands respectively, and the Deaths at each Age, during the year 1866.. 261

No. XXXI. Abstract showing the Cases of Sickness and Deaths among the Troops ON BOARD SHIP proceeding on Foreign Service 265

No. XXXII. Abstract showing the Cases of Sickness and Deaths among the Troops on board Ship returning from Foreign Service 268

No. XXXIII. *Abstract showing the Cases of Sickness and Deaths among Troops on Ship Board proceeding from one Colony or Station to another* 271

No. XXXIV. Abstract showing the Results of Meteorological Observations taken in the year 1866 at Home Stations.. 274

No. XXXV. Ditto ditto at Foreign Stations 286

No. XXXVI. Report on Hygiene. By Dr. Parkes 296

No. XXXVII. On the Power of Disinfectants in Preventing the Putrefaction of Sewage. By Dr. Parkes 318

No. XXXVIII. Report on the Wells at Kandy. By Staff Assistant-Surgeon W. R. Kynsey 325

No. XXXIX. Analysis of the Red Earth or Soil of Sierra Leone. By Staff Assistant-Surgeon J. A. B. Horton, M.D. 333

No. XL. Report on Cholera in Bengal in 1867. By Dr. Beatson 335

No. XLI. Report on Cholera in the Sirhind Division, 1867. By Dr. W. Munro, C.B. 360

No. XLII. Report on Cholera in the Oude and Rohilcund Districts. By J. H. K. Innes, C.B. 372

No. XLIII. Cholera in 1867, in the North Western and Central Provinces of India. By Assistant-Surgeon Sutherland 380

No. XLIV. Pandemic Waves in the production of Cholera. By Inspector-General Lawson 383

No. XLV. Cerebro Spinal Meningitis 426

No. XLVI. Report on Fever, Mauritius, 1866–67. By Surgeon-Major John Small, and Assistant-Surgeon W. H. J. Power 442

No. XLVII. Fever in Malta. By Assistant-Surgeon J. P. H. Boileau .. 478

No. XLVIII. Fever on Mount Aboo. By Staff Assistant-Surgeon Veale .. 493

No. XLIX. Cases of Fever, with remarks on the Topography, Climate, and Sanitary condition of Newera Ellia. By Staff Assistant-Surgeon Hugh D. Massy 496

No. L. Remarks on Malaria. By Staff Assistant-Surgeon Wm Hensman .. 505

PAGE

No. LI. Cases :—
Traumatic Tetanus. By Surgeon Macfadin, 13th Light Infantry .. 512
Gun-shot Wound and Amputation of Hip Joint. By Dr. Thomson and Mr. Dale 514
Two Cases of Injury from the bursting of a Gun. By Mr. Franklyn, R.A. 518
Suicide by Pistol Shot in left side. By Dr. White, R.A. 521
Cut Throat, followed by Secondary Hæmorrhage. By Mr. Spurway, R.A. 522
Dislocation of Great Toe Joint. By Mr. W. R. Steuart 523
Aneurism. By Mr. Harrison, R.A. 524
Aneurism. By Mr. McNalty 525
Aortic Aneurism. By Mr. Ovens 528
Larvæ in Human Nostril. By Dr. Quinton, R.A. 529
Yellow Fever treated by Sulphuric Acid Bath. By Dr. Grant .. 530
Pneumonia, Digitalis in. By Mr. W. R. Steuart 533
Spontaneous Expulsion of a Fœtus. By Dr. Boileau 535
Feigned Blindness and Loss of Voice. By Mr. Paynter 535
Feigned Insanity. By Dr. Boileau 536
Feigned Rheumatism. By Dr. Boileau 538
Fatal Case of Pyæmia. By Mr. Perry, R.A. 539
Gun-Shot Wound of Face. By Mr. Mundy 541
Perforation of Œsophagus by Splinter of Bone. By Dr. Spry .. 544
Typhus Fever. By Mr. Ovens 546
No. LII. Aneurism and Diseases of the Heart among the Troops in South Africa. By Robert Lawson, Inspector-General of Hospitals 548
No. LIII. The New Zealand War. Supplementary Report, 1866-67. By Dr. Gibb 558
No. LIV. Report on the Hospital Ship "Queen of the South." By Staff Surgeon Chartres 571
No. LV. Medical History of Hong Kong. By Dr. Heffernan 596
No. LVI. Chinese Treatise on Zymosis 604
No. LVII. On the Proper Carriage of Stretchers and other conveyances of this class. By Deputy Inspector-General Longmore, C.B., Professor of Military Surgery, Netley 613
No. LVIII. Army Medical School, Netley; and Alexander Prize 622
No. LIX. Army Medico-Chirurgical Society of Portsmouth 633
No. LX. Circulars, General Orders, &c. :—
Cholera Belts 638
Cholera Instructions 638
Sale of Commissions—Medical Certificates 643
Disinfectants 643
Charge Pay, Medical Officers 643
Nomenclature of Diseases 644
Medical Comforts, Troops on the March 644
Medical Officers 644
Hospitals, Admissions into Female 644
Hospital Establishments 644
Insane Soldiers 645
Wages of Hospital Servants on Board Ship 645
Certificates of Vaccination 646
Precautions in Infectious Disease 646
Claret as an extra 646
Principal Medical Officer's Inspection Reports 646

ERRATA IN REPORT FOR 1865.

Page 40, fourth line of Table, third Column, *for* 48·4 *read* 118·4.
„ 42, Royal Malta Fencible Artillery, line 1, *for* 1864 *read* 1865.
„ 73, Table, Gold Coast, *for* 60·81 *read* 75·45.
„ 89, second Table, Age 30–34, *for* 32·63 *read* 52·63.
„ 146. Heading of Table, Bombay, *for* 1866 *read* 1860–4.

ARMY MEDICAL DEPARTMENT REPORT FOR 1866.

I.—ON THE HEALTH OF THE TROOPS SERVING IN THE UNITED KINGDOM, IN 1866.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

THE average strength of non-commissioned officers and men serving in the United Kingdom during the 52 weeks ending 28th December, 1866, as shown by the weekly returns transmitted to the Army Medical Department, amounted to 70,292; the admissions into hospital to 59,966; the deaths, from all causes, both in and out of hospital, to 676; and the average number constantly sick to 2,942. The proportion, therefore, of admissions was 853; of deaths, 9·62; and of men non-effective from sickness, 41·85 per 1,000 of mean strength. Of the deaths, 82 occurred when the men were absent from their corps. *United Kingdom.*

The following Table shows the relative proportion of admissions, deaths, and mean daily sick in 1866 and the preceding six years :—

	Ratio per 1,000 of Mean Strength.		
	Admitted into Hospital.	Died.	Constantly Sick.
1866..	853	9·62	41·85
1860–65	993	9·30	51·26

The admissions into hospital and number constantly non-effective from sickness, in 1866, were greatly under, but the mortality was slightly above, the average.

Compared with the results for 1865, the decrease in the admissions and mean sick has amounted to about one-tenth, and the increase in the deaths to one-twelfth of the whole.

United Kingdom. The influence of the different classes of diseases, in causing sickness and mortality, is shown in the following table :—

Orders.	Average Strength, 70.292.	Admitted into Hospital	Died.			Ratio per 1,000 of Mean Strength.			
						1866.		1860–5.	
			With the Regiment.	Absent from the Regiment.	Total.	Admitted.	Died.	Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	11,494	73	10	83	163·5	1·18	207·2	1·08
2	Enthetic „ ..	18,170	11	..	11	258·5	·16	325·6	·11
3	Dietic „ ..	586	6	..	6	8·0	·08	7·7	·07
4	Parasitic „ ..	2,506	..	..	..	35·6	..	38·9	·01
	Class II.								
1	Diathetic Diseases ..	312	11	..	11	4·4	·16	3·2	·13
2	Tubercular „ ..	1,190	173	36	209	16·9	2·97	17·8	3·17
	Class III. Diseases of the—								
1	Nervous System ..	1,283	42	7	49	18·2	·70	19·3	·73
2	Circulatory „ ..	636	80	7	87	9·0	1·23	9·0	·91
3	Respiratory „ ..	5,742	78	5	83	81·7	1·18	91·8	1·38
4	Digestive „ ..	2,489	34	3	37	35·4	·53	37·7	·54
5	Urinary „ ..	218	15	3	18	3·1	·26	2·9	·14
6	Reproductive „ ..	834	..	..	..	11·9	..	9·8	..
7	Locomotive „ ..	316	3	..	3	4·5	·04	3·9	·01
8	Integumentary „ ..	8,088	2	..	2	115·4	·03	128·7	·06
	Class IV.								
4	Diseases of Nutrition..	167	1	..	1	2·3	·01	2·1	·03
	Class V.								
1	Accidents	5,743	39	9	48	81·8	·69	84·1	·61
3	Homicide	3	..	..	..	} ·2	·39	·2	{ ·02
4	Suicide	13	26	1	27				{ ·28
5	Execution	..	..	1	1	..	·01	..	·01
6	Corporal Punishment..	149	..	..	..	2·1	..	2·0	..
	No Appreciable Disease	25	..	..	..	} ·6	..	1·4	·01
	Malingering	2	..	..	..				
	Total ..	59,966	594	82	676	853·1	9·62	993·3	9·30

The reduction in the proportion of admissions is most marked in venereal and miasmatic diseases, and has also extended, though in a much less degree, to those of the integumentary and respiratory systems.

On comparing the ratios with those for 1865 the reduction will be found in the same classes. The increase in the mortality has not been confined to any one class ; it has been greatest in tubercular and miasmatic diseases, but the former had, in 1865, been considerably under the average.

The sickness and mortality at the different groups of stations, during the year, were as follows —

United Kingdom.

	Average Strength.	Admitted into Hospital.	Died.	Average constantly Sick.
1. Seaport Towns	9,410	9,115	81	447
2. Dockyards and Arsenals	8,450	7,459	93	383
3. Camps	18,628	15,311	142	785
4. Large Manufacturing Towns ..	2,768	2,581	21	119
5. London and Windsor	5,240	4,156	33	233
6. Dublin	4,986	4,753	50	232
7. Stations of Depôt Battalions not included in preceding groups ..	7,239	7,401	60	312
8. Remaining Stations	13,571	9,190	114	431
9. Detached from their Corps ..	..	..	82	..
Total ..	70,292	59,966	676	2,942

The following Table shows the proportion per 1,000 of mean strength, calculated from these numbers, contrasted with the results for the preceding six years :—

	Ratio per 1,000 of Strength.					
	1866.			1860–65.		
	Admitted into Hospital.	Died.	Constantly Sick.	Admitted into Hospital.	Died.	Constantly Sick.
1. Seaport Towns	969	8·61	47·50	1,013	9·07	54·76
2. Dockyards and Arsenals ..	883	11·01	45·32	1,130	9·61	57·73
3. Camps	822	7·63	42·14	933	6·43	49·48
4. Large Manufacturing Towns	932	7·59	42·99	1,069	8·43	49·73
5. London and Windsor	793	6·30	44·49	898	8·11	52·44
6. Dublin	953	10·02	46·53	958	8·05	55·54
7. Stations of Depôt Battalions not included in preceding groups	1,022	8·28	43·10	1,039	8·86	51·54
8. Remaining Stations ..	677	8·40	31·76	944	7·04	41·67
Total, including men detached from their Corps	853	9·62	41·85	993	9·30	51·26

The admissions have been considerably under the average of the six preceding years at all the groups of stations except Dublin and the Stations of Depôt Battalions, where the reductions have been very trifling. At the Seaport Towns, large Manufacturing Towns, London and Windsor, and the Stations of Depôt Battalions, the mortality has been under the average, but at all the other groups it has been above it ; the increase being most marked at Dublin.

Compared with the results for 1865, there has been a reduction in the admissions at all the groups, except the Seaport Towns ; there has also been a reduction in the mortality at Seaport Towns, London and Windsor, and the Stations of Depôt Battalions, but an increase at all the others ; and there has been a decrease in the mean daily sick, except at the Dockyards and Arsenals and the Stations of Depôt Battalions.

The admissions and deaths by the different classes of diseases at each group of stations are shown in the following Table :—

Orders.	Groups of Stations	Seaports.		Dockyards and Arsenals.		Camps.		Manufacturing Towns.		London and Windsor.		Dublin.		Depôt Battalions.		Remaining Stations.		Men detached from their Corps.
	Average Strength	9,410		8,450		18,628		2,768		5,240		4,986		7,239		13,571		
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	
	Class I.																	
1	Miasmatic Diseases ..	1,516	11	1,421	8	2,860	17	464	3	834	5	913	10	1,679	6	1,807	13	10
2	Enthetic „ ..	3,022	1	2,093	1	4,726	2	795	..	1,430	..	1,608	3	2,047	..	2,449	4	..
3	Dietic „ ..	108	..	76	2	107	1	22	..	50	..	23	..	75	1	125	2	..
4	Parasitic „ ..	497	..	420	..	542	..	124	..	134	..	92	..	333	..	364	..	..
	Class II.																	
1	Diathetic Diseases ..	28	2	31	..	100	3	19	..	33	..	20	2	28	1	53	3	..
2	Tubercular „ ..	150	22	232	41	247	37	47	8	86	13	95	14	95	12	238	26	36
	Class III.																	
	Diseases of the—																	
1	Nervous System ..	210	9	181	4	307	13	48	1	68	1	91	3	170	6	208	5	7
2	Circulatory „ ..	74	8	89	12	169	22	21	4	38	3	58	7	80	6	107	18	7
3	Respiratory „ ..	948	5	781	14	1,533	18	242	1	328	5	493	7	638	12	779	16	5
4	Digestive „ ..	378	5	330	5	647	9	99	2	185	2	194	1	274	4	382	6	3
5	Urinary „ ..	24	3	32	1	63	1	6	1	8	..	19	..	30	2	36	7	3
6	Reproductive „ ..	135	..	102	..	184	..	27	..	46	..	76	..	107	..	157	..	..
7	Locomotive „ ..	66	..	41	..	76	1	12	..	15	..	30	1	34	1	42	..	..
8	Integumentary „ ..	1,136	..	968	..	2,076	1	417	..	470	..	667	..	1,044	..	1,310	1	..
	Class IV.																	
4	Diseases of Nutrition ..	34	..	20	..	53	..	2	..	5	..	8	1	23	..	22	..	..
	Class V.																	
1	Accidents	760	10	626	..	1,564	12	232	..	420	1	338	1	719	5	1,084	10	9
3	Homicide	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4	Suicide	2	5	1	5	4	5	..	1	..	3	1	..	3	4	2	3	1
5	Execution	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
6	Corporal Punishment ..	23	..	10	..	48	..	4	..	4	..	26	..	12	..	22	..	..
	No appreciable disease .	4	..	2	..	5	..	..	..	2	..	1	..	10	..	3	..	..
	Total	9,115	81	7,459	93	15,311	142	2,581	21	4,156	33	4,753	50	7,401	60	9,190	114	82

RATIO per 1,000 of MEAN STRENGTH.

Orders.	Groups of Stations ..	Seaports.		Dockyards and Arsenals.		Camps.		Manufacturing Towns.		London and Windsor.		Dublin.		Depôt Battalions.		Remaining Stations.	
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.																
1	Miasmatic Diseases ..	161·1	1·17	168·2	·95	153·5	·91	167·6	1·09	159·2	·96	183·1	2·01	231·9	·83	133·2	·96
2	Enthetic „ ..	321·2	·11	247·7	·12	253·7	·11	287·2	..	272·9	..	322·5	·60	282·8	..	180·5	·29
3	Dietic „ ..	11·5	..	9·0	·24	5·7	·05	8·0	..	9·5	..	4·6	..	10·4	·14	9·2	·15
4	Parasitic „ ..	52·8	..	49·7	..	29·1	..	44·8	..	25·6	..	18·4	..	46·0	..	26·8	..
	Class II.																
1	Diathetic Diseases ..	3·0	·21	3·7	..	5·4	·16	6·9	..	6·3	..	4·0	·40	3·9	·14	3·9	·22
2	Tubercular „ ..	15·9	2·34	27·5	4·85	13·3	1·99	17·0	2·89	16·4	2·48	19·1	2·81	13·1	1·65	17·5	1·92
	Class III. Diseases of the—																
1	Nervous System „ ..	22·3	·96	21·5	·47	16·5	·70	17·3	·36	13·0	·19	18·3	·60	23·5	·83	15·3	·37
2	Circulatory „ ..	7·9	·85	10·5	1·42	9·1	1·18	7·6	1·45	7·2	·57	11·6	1·40	11·0	·83	7·9	1·32
3	Respiratory „ ..	100·7	·53	92·4	1·66	82·3	·97	87·4	·36	62·6	·96	98·9	1·40	88·1	1·65	57·4	1·18
4	Digestive „ ..	40·2	·53	39·0	·59	34·7	·49	35·8	·72	35·3	·38	38·9	·20	37·7	·55	28·1	·44
5	Urinary „ ..	2·6	·32	3·8	·12	3·4	·05	2·1	·36	1·5	..	3·8	..	4·1	·28	2·7	·52
6	Reproductive „ ..	14·3	..	12·1	..	9·9	..	9·8	..	8·8	..	15·2	..	14·7	..	11·6	..
7	Locomotive „ ..	7·0	..	4·8	..	4·1	·05	4·3	..	2·9	..	6·0	·20	4·7	·14	3·1	..
8	Integumentary „ ..	120·7	..	114·6	..	111·4	·05	150·7	..	89·7	..	133·8	..	144·2	..	96·5	·07
	Class IV.																
4	Diseases of Nutrition ..	3·6	..	2·4	..	2·8	..	·7	..	·9	..	1·6	·20	3·1	..	1·6	..
	Class V.																
1	Accidents	80·8	1·06	74·0	..	84·0	·65	83·8	..	80·1	·19	67·8	·20	99·5	·69	79·9	·74
3	Homicide	..	..	·3	..	..	..	..	..	..	..	..	..	..	..	..	..
4	Suicide	·2	·53	·1	·59	·2	·27	..	·36	..	·57	·2	..	·4	·55	·1	·22
6	Corporal Punishment ..	2·4	..	1·2	..	2·6	..	1·4	..	·8	..	5·2	..	2·0	..	1·6	..
	No appreciable disease	·4	..	·2	..	·2	..	..	..	·4	..	·2	..	1·3	..	·2	..
	Total	968·6	8·61	882·7	11·01	821·9	7·63	932·4	7·59	793·1	6·30	953·2	10·02	1022·4	8·28	677·1	8·40

United Kingdom. MIASMATIC DISEASES were less prevalent than in 1865 at all the groups of stations except Dublin and the Depôt Battalion Stations. The reduction was most marked in the large Manufacturing Towns. At Dublin the increase in the admissions was attended by a much higher rate of deaths, which was not the case at the Depôt Battalion Stations.

The proportion of admissions into hospital, and deaths by the principal diseases comprised in this class were as follows:—

		Annual Ratio per 1,000 of Mean Strength.							
		Seaport Towns.	Dockyards and Arsenals.	Camps.	Manufacturing Towns.	London and Windsor.	Dublin.	Depôt Battalion Stations.	Remaining Stations.
Eruptive Fevers ..	Admitted	2·0	2·2	1·9	4·3	5·0	1·0	5·0	1·1
	Died ..	..	·12	·05	..	·19	..	·14	..
Paroxysmal Fevers ..	Admitted	11·4	18·0	11·4	2·2	1·0	6·4	8·8	5·7
	Died ..	..	..	..	..	..	..	..	..
Continued Fevers ..	Admitted	14·7	11·5	11·9	20·2	20·2	13·6	15·0	14·7
	Died ..	·42	·24	·38	1·09	·57	·60	·28	·66
Dysentery & Diarrhœa	Admitted	19·4	26·4	16·4	23·9	32·2	30·9	20·0	16·8
	Died ..	·42	·35	·16	..	..	·40	..	·15
Spasmodic Cholera	Admitted	·1	·3	·2	..	·2	1·2	·3	..
	Died ..	..	·24	·16	..	..	·80	..	..
Sorethroat and Influenza	Admitted	35·4	40·0	39·9	39·0	44·1	63·4	76·4	32·4
	Died ..	..	..	..	..	..	·20	..	·07
Ophthalmia	Admitted	16.9	14·8	16·2	23·1	9·0	17·1	21·7	16·7
	Died ..	..	..	..	..	..	..	..	..
Rheumatism	Admitted	51·4	42·5	43·0	39·0	30·0	41·9	52·9	32·9
	Died ..	·11	..	..	..	..	..	·28	·07

Eruptive Fevers were less prevalent than in 1865 at all the groups of stations. Of the admisssions, 38 were from small-pox; 13 from chicken-pox; 70 from measles; and 47 from scarlet fever. Five cases of the latter disease and one of small-pox terminated fatally. London furnished the largest number of cases of small-pox; London and the Curragh the largest number of scarlet fever; and Warley and Chatham, of measles; but at none of the stations could the diseases be said to be epidemic among the men.

Paroxysmal Fevers were much more prevalent than in 1865 at the Dockyards and Arsenals, but they were the result of previous service of the men in tropical climates. There was a slight increase also at London and Windsor, Dublin, and the Depôt Battalion Stations, but at none of them were fevers of this type a cause of much sickness.

Continued Fevers continue to show a decreasing rate of admissions at all the groups of stations, a result which may be fairly attributed to the improvements which have been of late years made in the sanitary state of the Barracks. The highest proportion of cases still occurs, as might have been anticipated, in London and the large Manufacturing Towns.

Dysentery and Diarrhœa gave rise to a larger proportion of admissions than in 1865 at all the groups of stations except the "Remaining." This probably arose from the general prevalence of cholera during the third quarter of the year, as bowel complaints are invariably found to be in excess during such epidemics.

Spasmodic Cholera, which had for some time previously been epidemic in France, Holland, and Belgium, appeared in England in the end of June. It prevailed among the civil population pretty generally over the United Kingdom. Among the troops only 17 cases and 13 deaths were recorded,

including one returned as bilious cholera. Six cases and four deaths occurred in Dublin; three cases, all fatal, at the Curragh and Newbridge; three cases and two deaths at Woolwich: one fatal case under the head of bilious cholera at Portsea; one case at Parkhurst, one in London, one at Preston, and one at Lucan, all of which recovered. The three deaths of men absent from their corps occurred at Clackmannan, Liverpool, and in Ilford Gaol. The admissions were in the proportion of 0·24, and the deaths of 0·18 per 1,000 of mean strength. These results afford evidence of the value of the precautionary measures adopted on the first appearance of the disease in this country. *United Kingdom.*

ENTHETIC DISEASES were rather more prevalent than in 1865 at the Seaport Towns, the Dockyards and Arsenals, and the Stations of Depôt Battalions, but were less prevalent at all the other groups of stations. Their relative prevalence at the stations where considerable numbers of men are quartered is shown in the following Table:—

	Ratio per 1,000 of Mean Strength.			Ratio per 1,000 of Mean Strength.	
	1866.	1865.		1866.	1865.
Colchester	451	355	Aldershot	238	302
Canterbury	379	239	Woolwich	219	204
Portsmouth and Gosport	359	329	Shorncliffe	219	233
Warley	328	313	Curragh	217	258
Chatham and Sheerness	326	292	Belfast	215	288
Dublin	323	384	Edinburgh	171	236
Devonport and Plymouth ..	317	360	Cork	160	249
			Limerick	150	334
Manchester	312	382	Fermoy	149	124
Winchester	287	354	Pembroke Dock ..	100	184
Preston	272	370	London and Windsor — Household Cavalry ..	143	147
Isle of Wight	254	259	London and Windsor — Foot Guards	311	316
Dover	248	183			

There was a very marked excess in the amount of venereal cases at Canterbury, Colchester, and Dover; and there was an increase also, at Chatham and Sheerness, Portsmouth and Gosport, Fermoy, Woolwich, and at Warley. At all the other large stations the proportion was lower than in 1865.

The number of men constantly in hospital for venereal diseases amounted to 1,138, or 16·19 per 1000 of mean strength, being a reduction of 1·87 per 1,000 on the proportion of the preceding year. The loss of service during the year from these diseases was equal to that of the whole force in the United Kingdom for 5·91 days, and the average period the cases remained under treatment in hospital was 22·86 days.

On subdividing the cases into two general groups of syphilitic and gonorrhœal diseases, the following results are obtained for each group.

1866.	Admissions into Hospital.	Average constantly Sick.	Ratio per 1,000		Loss of Service to whole Force.	Duration of Cases in Hospital.
			Admitted.	Constantly Sick.		
					Days.	Days.
Syphilitic group ..	9,809	756	139·6	10·76	3·93	28·13
Gonorrhœal group .	8,361	382	118·9	5·43	1·98	16·68

These results, compared with a similar table in the Report for 1864, show a marked reduction in the syphilitic group, as regards the proportion admitted and the mean daily sick, and a very trifling reduction in the gonorrhœal group; and as a natural consequence the loss of service to the whole force has been diminished chiefly in the former group. The duration of the cases under treatment, however, shows a different result, the gonorrhœal cases having

United Kingdom.

undergone a reduction of one day, and the syphilitic, only rather more than half-a-day.

TUBERCULAR DISEASES caused a much higher proportion of admissions than usual at the Dockyards and Arsenals, but this may probably have been an accidental fluctuation. There is nothing more remarkable in connection with this class of diseases than the very trifling amount of variation, during the last four years, in the proportion both of cases and deaths, including those of men absent from their corps, when the observation extends over the whole force serving at home. The ratio per 1,000 of mean strength in each year, from 1860 to 1866, has been as follows :—

TUBERCULAR DISEASES.	1860	1861	1862	1863	1864	1865	1866
Ratio per 1,000 of strength admitted into hospital. ..	17·8	18·1	19·5	16·9	16·4	17·3	16·9
Died	3·47	3·34	3·67	2·99	2·94	2·48	2·96

It will be observed that a marked reduction in the proportion, both of cases and deaths, took place in 1863. This was probably the result of the alteration in the system of invaliding introduced in the early part of that year, by which men were sent to the Head-Quarters of the District when considered by the Commanding and Regimental Medical Officers, unfit for service, instead of being retained till the period of the half-yearly inspection, and then sent to the Invalid Depôt. It will be observed that since that regulation came in force, the admissions and deaths have been lower than formerly, but, with the exception of a reduction in the deaths in 1865, have varied little from year to year.

DISEASES OF THE INTEGUMENTARY SYSTEM were less prevalent at all the groups of stations except Dublin. The principal diseases in this class were boils (*phlegmon*) and ulcers.

ACCIDENTAL AND VIOLENT DEATHS were slightly above the average. Twenty-five were by drowning, one of them being suicidal. There were 27 deaths by suicide, being six more than in 1865 ; one only of them occurred when the man was absent from his corps. Eighteen of the men shot themselves and five cut their throats ; the remaining four deaths were caused by hanging, drowning, poison, and the man placing himself on the line of rails before an advancing train. One man of the 1st Battalion 13th Regiment, was hanged for murder.

Having thus shown the amount of sickness and mortality among the troops, at the different stations in the United Kingdom, we shall now submit the usual information on the same heads regarding the different arms of the Service, omitting all corps which served at home during a portion of the year only, in accordance with the principles explained in former reports.

The admissions into hospitals, deaths, and discharges by invaliding, in each arm, have been as follows :—

United Kingdom.

	Average Strength.	Admitted into Hospital.	Died in and out of Hospital.	Discharged as Invalids.	Annual Ratio per 1,000 of Strength.			1859-65. Annual Ratio per 1,000.		1860-5 Ratio per 1,000.
					Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
Household Cavalry	1,209	746	8	26	617	6·62	21·51	612	7·51	13·68
Dragoon Guards & Dragoons ..	7,694	5,366	61	215	697	7·93	27·94	941	6·27	30·87
Royal Artillery ..	7,873	6,730	87	250	855	11·06	31·75	1,036	7·17	*
Royal Engineers..	2,446	..	15	..	..	6·13	..	..	7·28	..
Military Train ..	1,422	1,194	10	32	839	7·03	22·50	1,047	6·68	26·40
Foot Guards ..	5,524	4,018	38	128	727	6·88	23·17	855	8·86	31·78
Infantry Regts. ..	19,545	14,781	140	516	756	7·16	26·40	848	7·95	30·26
Cavalry Depôt ..	1,020	1,207	15	37	1,183	14·70	36·26	1,232	9·48	39·04
Depôt Brig., R.A..	2,606	2,504	25	92	961	9·59	35·30	1,133	10·79	25·87
Coast Brig., R.A. .	1,780	..	30	19	..	16·85	10·67	..	19·86	8·98
Depôt Battalions .	12,865	10,239	133	493	796	10·34	38·32	1,014	11·83	43·24

Compared with the results for 1865 there has been a decrease in the admissions into hospital in all except the Cavalry Depôt, and Depôt Brigade, R.A., in which there was an increase; but the ratio of deaths has been higher in the Cavalry of the Line, the Royal Artillery, the Foot Guards, the Cavalry Depôt, the Depôt Brigade R.A., and the Depôt Battalions. The discharges by invaliding have also been higher than in 1865 in all the arms of the Service except the Foot Guards and Infantry Regiments.

The admissions have been above the average of the seven preceding years only in the Household Cavalry, and in it to a very trifling extent. The deaths, however, have been above the average in the Cavalry of the Line, the Royal Artillery, the Military Train, and the Cavalry Depôt. The invaliding has been under the average in all the arms except the Household Cavalry and the Royal Artillery, including the Depôt and Coast Brigades. As we have frequently pointed out, the high rate of mortality in the Coast Brigade is a result of its composition, the great majority of the men in it being old soldiers transferred from the other Brigades. The very low ratio of invaliding in it is due to most of the men being entitled to pension from length of service, and being discharged under that head instead of as invalids when no longer fit for duty.

On adding to the strength in the preceding table half the number of men placed on the pension list during the year from each of the corps included, and the total deaths which occurred among these men between the date of their discharge and the 31st of December, in accordance with the principles explained in former Reports, the following results are obtained :—

* Prior to 1864 it was found impossible to separate the invalids of the Brigades serving at home from those of the Depôt Brigades. The ratio discharged as invalids in 1866, calculated in the same manner as for the preceding years, would be 32·64 per 1,000 of the strength.

United Kingdom.

	1866.			1860–65.
	Average Strength corrected as above.	Deaths of Soldiers and Pensioners.	Ratio of Deaths per 1,000 of Strength.	Ratio of Deaths of Soldiers and Pensioners per 1,000 of Strength.
Household Cavalry	1,234	11	8·91	8·87
Cavalry of the Line	7,827	70	8·94	7·07
Royal Artillery	8,000	95	11·75	7·72
Military Train	1,434	12	8·37	7·25
Foot Guards	5,605	54	9·63	11·31
Infantry Regiments	19,926	165	8·28	9·34

When the deaths among the men placed on the pension list during the year are thus included, the ratio of mortality in 1866 has been highest in the Royal Artillery, and next in the Foot Guards, exclusive, of course, of the Depôt Brigades and Battalions. Compared with the results of the six preceding years, prepared on the same principle, there has been a marked reduction in the mortality of the Foot Guards and Infantry Regiments, but an increase in all the other arms and especially in the Royal Artillery.

The following Table, prepared from Abstract No. I. of Appendix, and from previous reports, shows the influence of the different classes of diseases on the health of the troops.

Orders.	Diseases.	Household Cavalry. Admitted.	Died.	Invalided.	Cavalry. Admitted.	Died.	Invalided.	Royal Artillery. Admitted.	Died.	Invalided.	Military Train. Admitted.	Died.	Invalided.	Foot Guards. Admitted.	Died.	Invalided.	Infantry Regiments. Admitted.	Died.	Invalided.	Cavalry Depôt. Admitted.	Died.	Invalided.	Depôt Brigade Royal Artillery. Admitted.	Died.	Invalided.	Infantry Depôt Battalions. Admitted.	Died.	Invalided.	Royal Engineers. Died.	Coast Brigade, R. A. Died.	Invalided.
	Strength	1,209			7,694			7,873			1,422			5,524			19,545			1,020			2,606			12,865			2,446	1,780	
	Class I.																														
1	Miasmatic Diseases ..	159	..	..	1,071	13	11	1,233	5	30	228	2	8	748	6	2	2,855	19	75	271	..	2	625	3	4	1,946	19	74	2	2	2
2	Enthetic „ ..	177	..	1	1,297	..	12	1,772	2	14	384	..	1	1,528	..	8	4,679	2	10	350	..	2	748	..	1	3,194	3	28	..	..	1
3	Dietic „ ..	12	..	..	27	2	..	101	1	..	18	..	..	38	..	..	116	1	..	9	..	..	22	..	..	89	2	1	..	..	..
4	Parasitic „ ..	3	..	..	81	..	..	185	..	1	34	..	..	158	..	..	652	..	1	26	..	..	146	..	..	585	..	..	..	..	..
	Class II.																														
1	Diathetic Diseases ..	14	..	..	41	3	3	41	2	2	7	..	1	22	..	1	51	2	1 2	4	..	..	10	..	1	57	4	7	..	..	..
2	Tubercular „ ..	12	4	12	77	15	41	126	30	55	14	1	8	85	16	58	291	36	26	17	4	5	25	8	22	216	39	101	5	15	7
	Class III. Diseases of the—																														
1	Nervous System ..	28	1	3	119	3	26	173	6	26	25	..	6	55	2	18	305	10	74	19	..	8	62	2	19	236	8	86	1	4	5
2	Circulatory „ ..	8	1	6	67	12	45	59	13	40	7	3	3	30	3	21	164	18	83	13	1	5	31	3	22	128	13	68	3	2	2
3	Respiratory „ ..	81	..	..	553	5	21	759	14	15	108	1	1	293	5	10	1,588	17	47	93	3	..	171	4	4	938	21	33	2	4	1
4	Digestive „ ..	54	1	3	205	1	26	347	3	20	53	1	2	153	1	2	630	12	39	43	2	4	84	2	10	391	8	34	..	..	..
5	Urinary „ ..	..	..	..	19	1	6	28	2	5	7	..	..	8	..	..	54	6	4	9	1	..	5	..	..	44	2	6	..	1	..
6	Reproductive „ ..	13	..	1	68	..	1	119	..	4	18	..	1	43	..	..	197	..	3	22	..	..	28	..	3	117	..	5	..	..	..
7	Locomotive „ ..	..	..	..	34	..	11	56	..	6	2	..	..	18	1	2	71	1	16	9	..	4	14	..	2	45	..	11	..	..	1
8	Integumentary „ ..	75	..	..	958	..	7	864	..	5	148	..	..	483	..	2	1,785	1	10	176	..	4	306	..	2	1,421	1	13	..	..	1
	Class IV.																														
4	Diseases of Nutrition.	..	..	..	7	..	1	20	..	7	3	..	1	7	..	1	45	..	12	3	..	1	6	..	1	50	..	15	..	..	..
	Class V.																														
1	Accidents	114	..	..	729	3	4	826	7	20	135	2	..	343	2	3	1,236	10	13	131	1	1	248	2	1	741	6	11	..	2	..
4	Suicide	1	1	..	3	3	..	1	2	..	..	..	..	..	2	..	5	4	1	..	3	..	2	1	..	..	7	..	2	..	..
5	Execution	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
6	Corporal Punishment.	..	..	..	10	..	..	19	..	..	3	..	..	4	..	..	50	..	..	1	..	..	1	..	..	30	..	..	..	..	..
	No appreciable disease	..	..	..	..	..	..	1	..	..	..	..	..	2	..	..	7	..	..	..	..	..	..	..	..	11	..	..	..	..	..
	Total	746	8	26	5,366	61	215	6,730	87	250	1,194	10	32	4,018	38	128	14,781	140	516	1,207	16	37	2,504	25	92	10,239	133	493	15	30	19

United Kingdom.

Ratio per 1,000 of Mean Strength.

Order.	Diseases.	Household Cavalry.			Cavalry.			Royal Artillery.			Military Train.			Foot Guards.			Infantry Regiments.			Cavalry Depôt.			Depôt Brigade Royal Artillery.			Infantry. Depôt Battalions.			Royal Engineers.	Coast Brigade, R.A.	
	Strength..	1,209			7,694			7,873			1,422			5,524			19,545			1,020			2,606			12,865			2,446	1780	
		Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Died.	Died.	Invalided.
	Class I.																													
1	Miasmatic Diseases ..	131·5	..	..	139·2	1·69	1·43	156·6	·61	3·81	160·3	1·41	5·63	135·4	1·09	·36	146·1	·97	3·84	265·7	..	1·96	239·8	1·15	1·54	151·3	1·48	5·75	·82	1·12	1·12
2	Enthetic „ ..	146·4	..	·83	168·6	..	1·56	225·1	·26	1·78	270·0	..	·70	276·6	..	1·45	239·4	·10	·51	349·0	..	1·96	287·0	..	·38	248·3	·23	2·18	..	..	·56
3	Dietic „ ..	9·9	..	..	3·8	·26	..	12·8	·12	..	12·7	..	..	6·9	..	..	5·9	·05	..	8·8	..	..	8·4	..	..	6·9	·16	·08	..	..	..
4	Parasitic „ ..	2·5	..	..	10·5	..	..	23·5	..	·13	23·9	..	..	28·6	..	..	33·4	..	·05	25·9	..	..	56·0	..	..	45·5	..	..	..	..	..
	Class II.																													
1	Diathetic Diseases ..	11·6	..	..	3·3	·39	·39	5·2	·26	·25	4·9	..	·70	4·0	..	·18	2·6	·10	·10	3·9	..	..	3·8	..	·38	4·4	·31	·54	..	..	..
2	Tubercular „ ..	9·9	3·30	9·93	10·0	1·95	5·33	16·0	3·81	6·99	9·9	·70	5·63	15·4	2·90	10·50	14·9	1·84	6·45	16·7	3·92	4·90	9·6	3·07	8·44	16·8	3·03	7·85	2·04	8·43	3·94
	Class III. Diseases of the—																													
1	Nervous System ..	19·0	·83	2·48	15·5	·39	3·38	22·0	·76	3·30	17·6	..	4·22	10·0	·36	3·26	15·6	·51	3·79	18·6	..	7·84	23·8	·77	7·29	18·3	·62	6·68	·41	2·25	2·81
2	Circulatory „ ..	6·6	·83	4·96	8·7	1·56	5·84	7·5	1·65	5·08	4·9	2·11	2·11	5·4	·54	3·80	8·4	·92	4·25	12·7	·98	4·90	11·9	1·15	8·44	9·9	1·01	5·29	1·22	1·12	1·12
3	Respiratory „ ..	67·0	..	..	71·9	·65	2·73	96·4	1·77	1·91	75·9	·70	·70	53·0	·91	1·81	81·2	·87	2·40	91·2	2·94	..	65·6	1·53	1·54	72·9	1·63	2·57	·82	2·25	·56
4	Digestive „ ..	44·7	·83	2·48	26·6	·13	3·38	44·1	·38	2·54	37·3	·70	1·41	27·7	·18	·36	32·2	·62	2·00	47·1	1·96	3·92	32·2	·77	3·84	30·4	·62	2·64	..	..	..
5	Urinary „ ..	..	..	..	2·5	·13	·78	3·6	·26	·63	4·9	..	..	1·4	..	..	2·8	·31	·20	8·8	·98	..	1·9	..	..	3·4	·16	·47	..	·56	..
6	Reproductive „ ..	10·8	..	·83	8·8	..	·13	15·1	..	·51	12·7	..	·70	7·8	..	..	10·1	..	·15	21·6	..	·98	10·8	..	1·15	9·1	..	·39	..	..	..
7	Locomotive „ ..	..	..	..	4·4	..	1·43	7·1	..	·76	1·4	..	..	3·3	·18	·36	3·6	·05	·82	8·8	..	3·92	5·4	..	·77	3·5	..	·85	..	..	..
8	Integumentary „ ..	62·0	..	..	124·5	..	·91	109·8	..	·63	104·1	..	..	87·4	..	·36	91·3	·05	·51	172·6	..	3·92	117·4	..	·77	110·4	·08	1·01	..	..	·56
	Class IV.																													
1	Diseases of Nutrition..	..	..	..	·9	..	·13	2·5	..	·89	2·1	..	·70	1·3	..	·18	2·3	..	·61	2·9	..	·98	2·3	..	·38	3·9	..	1·17	..	..	..
	Class V.																													
1	Accidents	94·3	..	..	94·8	·39	·52	104·9	·39	2·54	94·9	1·41	..	62·1	·36	·55	63·2	·51	·67	128·4	·98	·98	83·7	·77	·38	57·6	·47	·85	..	1·12	..
4	Suicide	·8	·83	..	·4	·39	..	·1	·26	..	..	..	..	..	·36	..	·3	·21	·05	..	2·94	..	·8	·38	..	..	·54	..	·82	..	..
5	Execution	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	·05	..	..	..	..	..	..	..	..	..	..	..	..	..
6	Corporal Punishment..	..	..	..	1·3	..	..	2·4	..	..	2·1	..	..	·7	..	..	2·6	..	..	1·0	..	..	·4	..	..	2·3	..	..	..	..	..
	No appreciable disease..	..	..	..	..	..	·1	..	..	..	..	..	..	·4	..	..	·3	..	..	..	..	..	..	..	..	·9	..	..	..	..	..
	Total	617·0	6·62	21·51	697·4	7·93	27·94	854·8	11·06	31·75	839·6	7·03	22·50	727·4	6·88	23·17	756·2	7·16	26·40	1188·3	14·70	36·26	960·8	9·59	35·30	795·8	10·34	38·32	6·13	16·85	10·67

MISASMATIC DISEASES were less prevalent than in 1865 in all the Arms except the Military Train, Infantry Regiments, and Depôt Brigade, R.A.; in the last of these the increase was considerable. When subdivided into groups these diseases furnish the following results :— *United Kingdom.*

		Annual Ratio per 1,000 of Mean Strength.								
		Household Cavalry.	Dragoon Guards and Dragoons.	Royal Artillery.	Military Train.	Foot Guards.	Infantry Regiments.	Cavalry Depôt.	Depôt Brigade, Royal Artillery.	Depôt Battalions.
Eruptive Fevers	Admitted	5·0	·5	2·2	1·4	4·2	1·4	..	6·5	2·5
	Died ..	..	..	..	..	·18	·05	..	..	·23
Paroxysmal Fevers ..	Admitted	1·5	1·6	9·4	1·4	·7	10·2	5·9	13·8	10·1
	Died ..	..	..	..	..	..	..	..	..	..
Continued Fevers ..	Admitted	4·1	11·4	11·8	14·8	18·8	14·5	10·8	24·9	13·1
	Died ..	..	·91	·25	..	·72	·51	..	·38	·54
Dysentery and Diarrhœa ..	Admitted	29·0	22·4	22·0	26·7	26·2	17·1	23·5	26·5	14·8
	Died ..	..	·13	·12	..	..	·05	..	·38	·31
Spasmodic Cholera ..	Admitted	..	·7	·1	·7	·2	·2	..	·4	·02
	Died ..	..	·52	·25	·70	..	·21	..	..	..
Sorethroat and Influenza ..	Admitted	36·4	40·4	28·5	50·6	41·1	34·3	37·2	72·9	51·0
	Died ..	..	..	..	·70	..	..	..	..	·08
Ophthalmia ..	Admitted	5·0	7·4	12·2	4·2	8·0	19·8	29·4	16·9	17·5
	Died ..	..	..	..	..	..	..	..	..	..
Rheumatism ..	Admitted	29·0	37·6	55·0	56·3	23·4	40·5	51·0	47·6	34·5
	Died ..	..	·13	..	..	..	..	..	.38	·08

Eruptive Fevers have not prevailed to any great extent. In the Depôt Brigade, R.A., the ratio has been rather high, from the occurrence of seven cases of measles in the R.H.A., at Maidstone, and five in the 3rd Division at Warley. In the Household Cavalry and Foot Guards also the ratio was above the average, chiefly from the occurrence of some cases of small-pox and scarlet fever in the 2nd Life Guards and the Coldstream Guards. Five cases terminated fatally, one of small-pox in the 8th Depôt Battalion, and four of scarlet fever in the Grenadier Guards, 69th Regiment, and 2nd and 12th Depôt Battalions.

Paroxysmal Fevers prevailed to some extent in the Royal Artillery, Infantry Regiments, the Depôt Brigade, R.A., and the Depôt Battalions. They were, in the majority of cases, the result of previous tropical service. The Infantry Regiments which furnished the greatest number of cases were the 48th, 52nd, 81st, and 89th, which had recently returned from India. The 9th and 12th Brigades of Royal Artillery had respectively 24 and 17 cases. The Surgeon of the D Battery 9th Brigade states that some of the cases were contracted in Romney Marshes, and the 12th had two batteries which had recently been serving in Hong Kong and Ceylon.

Continued Fevers have been less prevalent, than in 1865, in all the arms except the Depôt Brigade, R.A., in which the proportion was merely a trifle higher.

Dysentery and Diarrhœa were under the previous ratio in the Cavalry and Cavalry Depôt; they were in excess of it in the Military Train, Foot Guards, and Infantry Regiments, and in the other arms there was scarcely any appreciable change. Although, on the whole, the admissions were above the average, yet, considering the very general prevalence of diarrhœa among the civil population during four or five months when cholera was imminent and prevailing as an epidemic, these results are very satisfactory, and may be accepted as evidence of the advantage derived from those sanitary measures

United Kingdom.

which were brought into operation as soon as there was reason to apprehend a cholera visitation.

Sorethroat (Tonsillitis) *and Influenza* were less prevalent than in the preceding year in all the arms except the Military Train and Infantry Regiments. The 6th Dragoon Guards, in Ireland, in the spring, admitted a very large number of cases of influenza, but they were all of a very mild character.

Ophthalmia also shows a reduction in all arms except the Household Cavalry, Cavalry Depôt, and Depôt Brigade, R.A. The Corps which furnished the largest number of cases were the 1st Battalions of the 14th and 21st, the 39th and 48th Regiments.

Enthetic Diseases were greatly in excess of the amount in 1865 in the Cavalry Depôt at Canterbury, and there was an increase, but to no great extent, in the Depôt Brigade R.A., and the Foot Guards. In all the other arms there was a decrease, which was most marked in the Cavalry. It is worthy of remark that while the highest ratio, if the Depôts be omitted, occurred in the Foot Guards, the lowest occurred in the Household Cavalry quartered, with a slight exception, at the same stations—London and Windsor. The Foot Guards had one battalion also in Dublin, but although the admissions in it were slightly higher than in those in Great Britain, the difference was not so great as to affect materially the proportion. The Battalion of Guards which furnished the lowest proportion of cases was the 2nd of the Scots Fusilier Guards, which was quartered in January and February at Shorncliffe, the succeeding six months in the Tower of London, and the remainder of the year at Windsor.

Tubercular Diseases.—With the exception of the Household Cavalry, the Military Train, the Royal Engineers, and the Coast Brigade R.A., the mortality has been higher in all arms than in 1865, but in that year the ratio was exceptionally low. The proportion invalided on account of these diseases was lower than in the preceding year in the Foot Guards, Infantry Regiments, Cavalry Depôt, and Depôt Battalions; but in the other arms it shows an increase.

Diseases of the Integumentary System.—The reduction in the admissions by this class of diseases, to which we called attention in the remarks upon the groups of Stations, has been experienced in all the arms. It has taken place chiefly in boils (*phlegmon*) and ulcers.

The other classes do not seem to require special comment.

The admissions into hospital, deaths, and discharges by invaliding in each of the Corps included in these returns are shown in the following Table :—

United Kingdom.

Regiments, &c.	Strength.	Admitted into Hospital.	Died. In Hospital.	Died. Out of Hospital.	Total Deaths.	Discharged as Invalids.	Annual Ratio per 1,000. Admitted.	Annual Ratio per 1,000. Died.	Annual Ratio per 1,000. Invalided.	Stations.	months.
1st Life Gds.	402	223	1	1	2	7	554·7	4·98	17·41	Windsor	3
										London	9
2nd „	409	267	1	2	3	13	652·8	7·33	31·71	London	12
R. Horse Gds.	398	256	1	2	3	6	643·2	7·54	15·08	London	3
										Windsor	9
	1,209	746	3	5	8	26	617·0	6·62	21·51		
4th Dr. Gds.	551	315	4	3	7	22	572·7	12·70	39·93	Cork*	8
										Newbridge	4
5th „	546	491	5	1	6	18	899·3	10·99	32·97	Dublin	10
										Curragh*	2
6th „	530	464	4	2	6	24	875·5	11·32	45·28	Hounslow	1⅔
										Dublin, Curragh	6
										Cahir*	4⅓
1st Dragoons	562	449	1	..	1	6	798·9	1·78	10·68	Shorncliffe	3
										On the march	⅔
										Manchester, Ashton, Bury, Burnley	8⅓
2nd „	538	309	3	2	5	19	574·3	9·29	35·32	Newbridge	10
										Dublin	2
3rd Hussars	555	355	4	2	6	8	639·6	10·81	14·41	Aldershot	12
4th „	550	274	4	..	4	10	498·2	7·27	18·18	Edinburgh	12
										Detacht. at Hamilton, Perth, and Newcastle	
8th „	553	374	..	2	2	13	676·3	3·62	23·51	Aldershot	8
										Birmingm.&c.	4
9th Lancers	538	205	5	1	6	8	381·0	11·15	14·87	Dundalk*	6
										Curragh	4
										Dublin	2
10th Hussars	568	480	1	..	1	25	845·1	1·76	44·01	Dublin	6
										Dundalk*	6
12th Lancers	548	332	3	..	3	2	605·8	5·47	3·65	Cahir*	8
										Cork*	4
14th Hussars	562	293	3	2	5	15	521·3	8·90	26·69	Aldershot	2
										Hounslow	10
15th „	551	660	4	..	4	22	1197·8	7·26	39·93	Sheffield, Manchster	4
										Aldershot	8
17th Lancers	542	365	3	2	5	23	673·4	9·22	42·43	Colchester	2½
										Aldershot	9½
	7,694	5,366	44	17	61	215	697·4	7·93	27·94		

* These corps furnished small detachments also during the Fenian outbreak.

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Regiments, &c.	Strength.	Admitted into Hospital.	Died. In Hospital.	Died. Out of Hospital.	Total Deaths.	Discharged as Invalids.	Annual Ratio per 1,000. Admitted.	Died.	Invalided.	Stations.
										months.
Rl. Artillery:										
B Brigade R.H.A.	953	698	10	2	12	29	732·4	12·59	30·43	Hd-Qrs. at Woolwich, Batts. at Dublin Brighton Newbridge Dorchester Woolwich 12
C Brigade R.H.A.	574	913	7	4	11	20	1590·6	19·16	34·84	Hd-Qrs. at Woolwich 12; 2 Batts. at Aldershot 4½
Riding Establishment	207	155	4	1	5	6	748·8	24·15	28·99	Woolwich 12
4th Brigade.	368	354	3	1	4	9	962·0	10·87	24·46	A Bristol 3½, Devonpt. 8½; B Woolch. 3½, Chatham 7, York 1½
5th ,,	556	484	5	1	6	23	870·5	10·79	41·37	Woolwich 12
6th ,,	850	788	5	1	6	56	927·1	7·22	65·88	Portsmth. & Channl. Islands 12
7th ,,	785	566	6	2	8	23	721·0	10·19	29·30	Plymth. & Pembroke Dock 12
8th ,,	535	450	3	1	4	11	841·1	7·48	20·56	E Devnpt. 3½, on march 5½, Aldrsht. 8; G Ballincllg. 12; H Athlone. 8, Curragh 1, Fermoy & Waterfd. 3
9th ,,	1,472	1,143	13	5	18	27	776·5	12·23	18·34	Hd-Qrs. at Shorncliffe 5, Dublin 7, Batts. at Aldershot Portsmouth Chatham Leith Fort Kilkenny Curragh Athlone Limerick Fermoy
12th ,,	797	608	3	3	6	22	762·9	7·53	27·60	Portsmh. & I. of Wght. 12
13th	776	571	6	2	8	24	735·8	10·31	30·93	Dover 12, Detachmt. at Dublin 1
	7,873	6,730	65	23	88	250	854·8	11·18	31·7[illegible]	

United Kingdom.

Regiments, &c.	Strength.	Admitted into Hospital.	Died. In Hospital.	Died. Out of Hospital.	Total Deaths.	Discharged as Invalids.	Annual Ratio per 1,000. Admitted.	Annual Ratio per 1,000. Died.	Annual Ratio per 1,000. Invalided.	Stations.	months.
Military Train	564	410	..	3	3	11	726·9	5·32	19·50	Aldershot	12
	284	347	3	..	3	14	1221·8	10·56	49·30	Curragh & Dublin	12
	574	437	4	..	4	7	761·3	6·97	12·19	Woolwich	12
	1,422	1,194	7	3	10	32	839·7	7·03	22·50		
Gren. Gds., 1st Bat. ..	778	594	4	3	7	23	763·5	9·00	29·56	London	12
2nd Bat. ..	776	663	2	..	2	21	854·4	2·58	27·06	Windsor	2
										London	10
3rd Bat. ..	779	621	4	..	4	24	797·2	5·13	30·81	London	6
										Windsor	6
Coldm. Gds., 1st Bat. ..	797	607	3	1	4	12	761·6	5·02	15·06	London	2
										Curragh	1½
										Dublin	8½
2nd Bat. ..	798	576	5	2	7	12	721·8	8·77	15·04	London	12
Scots F. Gds., 1st Bat. ..	801	592	5	2	7	36	739·1	8·74	22·56	London	12
2nd Bat. ..	795	365	5	2	7		459·1	8·80		Shorncliffe	2
										London	6
										Windsor	4
	5,524	4,018	28	10	38	128	727·4	6·88	23·17		
6th Foot, 1st Batt.	780	384	10	2	12	9	492·3	15·38	11·54	Chan. Isles	6
										Fermoy*	6
13th Foot, 1st Batt.	783	435	4	1	5	9	555·6	6·38	11·49	Aldershot	4
										Devonport	4
										Cork*	3
										Kinsale	1
14th Foot, 1st Batt.	785	490	2	..	2	15	624·2	2·55	19·11	Portsmouth	2
										Sheffield with Detchts. at Weedon & Coventry	4½
										Curragh	5½
17th Foot, 1st Batt.	796	392	9	..	9	10	492·5	11·31	12·56	Aldershot	8
										Devonport	4
21st Foot, 1st Batt.	819	661	5	2	7	15	807·1	8·55	18·31	Glasgow with Detchts. at Ayr & Paisley	8⅓
										Dublin	3⅔
28th Foot ..	762	468	6	1	7	21	614·2	9·19	27·56	Aldershot	11
										Mullingar*	1
31st „ ..	746	334	4	2	6	22	447·7	8·04	29·49	Aldershot	2
										Portsmouth	5
										Curragh	4½
										Kilkenny with Detcht. at the Curragh	½

* These corps furnished small detachments also during the Fenian outbreak.

United Kingdom.

Regiments, &c.	Strength.	Admitted into Hospital.	Died. In Hospital.	Died. Out of Hospital.	Total Deaths.	Discharged as Invalids.	Annual Ratio per 1,000. Admitted.	Annual Ratio per 1,000. Died.	Annual Ratio per 1,000. Invalided.	Stations.	months.
39th Foot ..	772	550	5	1	6	10	712·4	7·77	12·95	Dover Manchester with Detchts. at Newcastle, Chester, Weedon, and Liverpool Enniskillen, Newry, and Curragh	1⅘ 9⅛ 1
48th „	753	626	1	2	3	4	831·3	3·98	5·31	Shorncliffe Aldershot Curragh	5⅘ 5⅝ ⅛
52nd „	744	800	7	..	7	25	1075·3	9·41	33·60	Portsmouth Aldershot Dublin	2 9 1
59th „	761	499	6	1	7	30	655·7	9·20	39·42	Birr* Athlone	5 7
60th Foot, 2nd Batt.	708	543	7	1	8	43	766·9	11·30	60·73	Dover Dublin Curragh Cork	1 5 5 1
62nd Foot ..	761	434	3	..	3	8	570·3	3·94	10·51	Pembrke. Dk. with Detcht. at Devonport Gosport with Detchts. at Weymouth and Portland Buttevant & Cork	2 5 5
63rd „ ..	743	455	1	..	1	11	612·4	1·34	14·80	Aldershot Glasgow with Detchts. at Ayr & Paisley	8⅘ 3⅛
64th „ ..	773	390	..	1	1	23	504·5	1·29	29·75	Curragh Templemore Kilkenny	2 7 3
65th „ ..	619	910	2	..	2	29	1470·2	3·23	46·85	Devonport Aldershot	11 1
66th „ ..	737	735	4	1	5	27	997·3	6·78	36·63	Devonport Aldershot	4 8
69th „ ..	790	723	10	2	12	22	915·2	15·19	27·85	Aldershot Chan. Isles	6 6
71st „ ..	710	562	6	2	8	17	791·5	11·27	23·94	Edinburgh Aldershot Fermoy with Detchts. at Cork and Ballincollig	1⅓ 10 ½
74th „ ..	655	368	3	2	5	10	561·8	7·63	15·27	Aldershot Dover Limerick with Detchts. at Clare Castle and Nenagh	1⅔ 5⅔ 4½

* This corps furnished a small detachment also during the Fenian outbreak.

United Kingdom.

Regiments, Depôt Battalions, &c.	Strength.	Admitted into Hospital.	Died. In Hospital.	Died. Out of Hospital.	Total Deaths.	Discharged as Invalids.	Annual Ratio per 1,000. Admitted.	Died	Invalided.	Stations.	months.
75th Foot ..	791	701	3	..	3	31	886·2	3·79	39·19	Gosport with Detchts. at Portland, Weymouth, & Marchwood	2
										Dublin	6½
										Kilkenny	3½
										Waterford	½
81st „ ..	747	884	5	..	5	49	1183·4	6·69	65·60	Gosport	2⅔
										Aldershot	9⅓
83rd „ ..	774	528	2	1	3	17	682·2	3·88	21·96	Sheffield with Detchts. at Weedon & Tynemouth	1
										Curragh	5
										Enniskillen	3
										Dublin	3
85th „ ..	791	733	2	..	2	22	926·7	2·53	27·81	Manchester with Detchts. at Chester, Newcastle, & Tynemouth	1⅔
										Curragh	4⅓
										Dublin	6
89th „ ..	689	675	3	3	6	17	979·7	8·71	24·67	Shorncliffe	3
										Aldershot	9
92nd „ ..	756	501	2	3	5	20	662·7	6·61	26·45	Aldershot	2
										Dublin	10
	19,545	14,781	112	28	140	516	756·2	7·16	26·40		
Cavalry Depôt	1,020	1,207	7	8	15	37	1183·3	14·71	36·27	Canterbury	12
R.A. Dp. Brig.											
R.H.A. ..	384	365	1	2	3	3	950·5	7·81	7·81	Maidstone	12
1st Div., D.B.	555	448	7	2	9	32	807·2	16·22	57·66	Sheerness	12
2nd „ „	936	839	7	2	9	48	896·4	9·61	51·28	Woolwich	12
3rd „ „	731	852	3	1	4	9	1165·5	5·47	12·31	Warley	12
	2,606	2,504	18	7	25	92	960·9	9·59	35·30		
1st Dep. Bat.	964	750	3	1	4	14	778·0	4·15	14·52	Chatham	12
2nd „ ..	819	692	7	2	9	45	844·9	10·99	54·94	Chatham	12
3rd „ ..	655	490	4	1	5	31	748·1	7·63	47·33	Chatham	12
4th „ ..	1004	877	7	1	8	59	873·5	7·97	58·76	Colchester	12
5th „ ..	941	865	9	2	11	147	919·2	11·69	156·22	Parkhurst	12
6th „ ..	662	563	9	1	10	24	850·5	15·11	36·25	Walmer	12
7th „ ..	1129	991	5	1	6	14	877·8	5·31	12·40	Winchester	12
8th „ ..	829	870	8	1	9	21	1049·5	10·86	25·33	Colchester	12
9th „ ..	1066	1010	11	5	16	23	947·5	15·01	21·58	Preston	12
10th „ ..	871	582	4	1	5	14	668·2	5·74	16·07	Belfast*	5⅔
										Shorncliffe	6⅓

* This corps furnished a small detachment also during the Fenian outbreak.

United Kingdom.

Regiments, Depôt Battalions, &c.	Strength.	Admitted into Hospital.	Died. In Hospital.	Died. Out of Hospital.	Total Deaths.	Discharged as Invalids.	Annual Ratio per 1,000. Admitted.	Annual Ratio per 1,000. Died.	Annual Ratio per 1,000. Invalided.	Stations.	months.
11th Dep. Bat.	646	693	7	1	8	21	1072·8	12·38	32·51	Newry and Enniskillen	6½
										Gosport	5½
12th „ ..	665	302	5	1	6	26	454·1	9·02	39·10	Mullingar	7½
										Shorncliffe	4½
13th „ ..	888	398	9	..	9	16	448·2	10·13	18·02	Fermoy	¼
										Curragh	3½
										Pembroke Dock	8
14th „ ..	1,024	510	17	2	19	26	498·0	18·55	25·39	Buttevant	6¾
										Sheffield	5¼
15th „ ..	702	646	5	3	8	12	920·2	11·40	17·09	Aberdeen & Stirling	12
	12,865	10,239	111	22	133	493	795·9	10·34	38·32		

In the Household Cavalry the proportion of admissions into hospital and of discharges by invaliding has been highest in the 2nd Life Guards, quartered in London during the whole year, and that of deaths in the Royal Horse Guards. The excess of sickness was chiefly apparent in cases of sore-throat, bronchitis, and diarrhœa.

In the Cavalry of the Line, the 15th Hussars, at Sheffield, Manchester, and Aldershot, had the highest ratio of admissions; the 4th Dragoon Guards, at Cork and Newbridge, of deaths; and the 6th Dragoon Guards, at Dublin, the Curragh, and Cahir, of discharges by invaliding. In the 15th Hussars, venereal diseases and those of the integumentary system were the chief causes of the excess; under the latter, 124 cases of ulcer are entered being thrice as many as were reported by any other Cavalry Regiment Bronchitis was also very prevalent in the Corps. The admissions were also high in the 5th and 6th Dragoon Guards and 10th Hussars; in the latter chiefly from venereal diseases; in the 6th Dragoon Guards from the prevalence of sorethroat and bronchitis; and in the 5th Dragoon Guards, from venereal diseases, bronchitis, boils, abscesses and ulcers.

In the Guards the admissions were highest, as in the preceding year, in the 2nd Battalion Grenadier Guards, quartered at Windsor and London, and lowest in the 2nd Battalion Scots Fusilier Guards, at Shorncliffe, London, and Windsor, the stations at which the highest ratio of admissions in the Guards occurred in 1865. The mortality was highest in the 1st and lowest in the 2nd Battalion Grenadier Guards, and the invaliding was highest in the Grenadier and lowest in the Coldstream Guards.

The highest ratio of admissions in the Infantry was in the 65th Regiment, which had just arrived from New Zealand, and next to it in the 81st and 52nd Regiments, both recently returned from India. The most prevalent diseases in the 65th, quartered during 11 months at Devonport, were venereal affections and itch. In the 81st, quartered at Gosport and Aldershot, the proportion of venereal diseases was very low; the excess of admissions was chiefly due to influenza and bronchitis, rheumatism, intermittent fever, and itch; and in the 52nd Regiment, at Portsmouth, Aldershot, and Dublin, the most prominent causes of admission were venereal diseases, rheumatism, bronchitis, and diseases of the digestive and integumentary systems. Venereal diseases were very prevalent also in the 1st Battalions 14th and 21st, and in the 83rd and 85th Regiments. The lowest ratio of admissions was in the 31st Regiment, at Aldershot, Portsmouth, and the Curragh, which enjoyed a very marked exemption from

diseases of the digestive system. The invaliding was highest in the 81st and lowest in the 48th; but the amount in each corps is, of course, considerably affected by the period at which it returned from foreign service and the climate in which it had last served. *United Kingdom.*

RE-VACCINATION.—The monthly vaccination returns from the corps serving in the United Kingdom show the results of the operation on 383 soldiers, and 12,210 recruits to have been as follows. The numbers from which the ratios have been calculated are stated in Abstract No. II. of Appendix.

	Total number Vaccinated.	Results.	Ratio per 1,000. In those who bore marks of previous Small-Pox.	In those who bore good marks of previous Vaccination.	In those who bore doubtful marks of previous Vaccination.	In those who bore no marks of previous Vaccination or Small-pox.	Total.
Soldiers, not Recruits	383	A perfect Vaccine Pustule	206·9	142·8	208·1	307·7	201·0
		A modified ditto	413·8	342·9	355·7	476·9	376·0
		A failure	379·3	514·3	436·2	215·4	423·0
		Total	1000·	1000·	1000·	1000·	1000·
Recruits ..	12,210	A perfect Vaccine Pustule	230·3	340·1	359·8	486·3	341·1
		A modified ditto	326·0	313·7	344·5	239·9	311·6
		A failure	443·7	346·2	295·7	273·8	347·3
		Total	1000·	1000·	1000·	1000·	1000·

Compared with the results in 1865, the proportion of perfect vaccine pustules among the soldiers shows a considerable reduction, and the proportion of failures a marked increase. Among the recruits there has been a slight increase in the perfect and modified pustules, and a decrease in the failures.

Among the recruits found fit for service at the head quarters of the Recruiting Districts in 1866, the numbers bearing marks of small-pox and vaccination, or having no satisfactory marks were as follows:—

Recruiting Districts.	Marks of Small-Pox.	Marks of Vaccination.	No satisfactory Marks.	Proportion in every 1,000. Marks of Small-Pox.	Marks of Vaccination.	No satisfactory Marks.
London	288	4,390	78	60·6	923·0	16·4
Liverpool	140	965	135	112·9	778·2	108·9
Bristol	45	447	36	85·2	846·6	68·2
Leeds	29	305	7	85·1	894·4	20·5
Edinburgh	8	115	9	60·6	871.2	68·2
Glasgow	78	422	49	142·1	868·7	89·2
Belfast	49	265	61	130·6	706·7	162·7
Dublin	56	1,064	66	47·2	897·2	55·6
Cork	1	33	3	27·0	891·9	81·1
Total England ..	502	6,107	256	73·1	889·6	37·3
Total Scotland ..	86	537	58	126·3	788·5	85·2
Total Ireland ..	106	1,362	130	66·3	852·3	81·4
Total ..	694	8,006	444	75·9	875·6	48·6

United Kingdom. This shows a reduction in the proportion having marks of small-pox in all three divisions of the kingdom, an increase in those having satisfactory marks of vaccination in England, and an increase in those having no satisfactory marks in Scotland and Ireland. Taking the total however, the results are satisfactory as showing a larger proportion protected by vaccination, and a smaller of those wholly unprotected as well as of men marked with small-pox, than in the preceding year.

SANITARY REPORT.

The Camp of Aldershot.

Inspector-General Mouat, V.C., C.B., reports that the station has been unusually healthy, considering the prevalence of cholera and diarrhœa in England. This favourable condition is doubtless due to its natural salubrity.

Venereal, as usual, contributes rather more than one-third to the entire admissions. A building has been opened for the reception of females, under the provisions of the Contagious Diseases Act, and placed under the charge of Surgeon Perry, Royal Artillery.

The sanitary improvements effected during the year have consisted in extension of the drainage, and the completion of Jennings's water-closets in the permanent barracks; likewise the completion of the huts occupied by married families in the north and south camps. The number in each hut has been reduced from 22 to 18.

Many married families still occupy ordinary barrack-rooms, both in the permanent Cavalry and Infantry Barracks, without the necessary means of separation, owing to the amount of accommodation being inadequate to the strength of the regiments. Representations have been made on this subject.

The radical defects of the present permanent married quarters are,—their deficiency of space; their back-to-back construction, and unsatisfactory arrangement for domestic convenience. The huts, although preferred by the married men, are objectionable in some respects, being too cold in winter and too hot in summer, and deficient in shelter, from not having a porch; they are built too near the ground, and many are showing symptoms of decay.

The surface drainage of the Cavalry Barracks is susceptible of improvement.

The latrines in the North Camp, although kept in good order, are inferior in most respects to those fitted on Jennings's system; but a want of water is the chief difficulty. Mr. Mouat considers there is no reason why the dry earth system, found to answer so admirably elsewhere, should not be tried here.

The sewerage of both camps is tolerably satisfactory, and the water supply for drinking and cooking good and sufficient.

The amount of fuel is generally considered inadequate, and great care and economy are required to make the week's supply last out. Mr. Mouat suggested the employment of cinder sifters (to save waste), as an experiment in one regiment, which is being carried out.

The Lieut.-General Commanding says that an urine tub, invented by Capt. Lempriere, R.E., has been on trial, and has answered admirably, as it emits no smell, and can be placed in the rooms, thus avoiding the necessity of men going out into a colder atmosphere at night; a satisfactory kind of urinal for barrack use has yet to be devised.

The rations were of good quality, and the clothing sufficient.

As compared with 1864–5, the number of admissions to the Children's Hospital, with measles (confined almost exclusively to the children of the 31st Regiment), was 69, and from scarlet fever 5, all of a mild type; no death occurred from either of these diseases.

The Hospital for Soldiers' Wives and Children contributes much to the comfort and well-being of the patients who are admitted, whilst it confers a benefit on the whole family of each; the value of this institution is seen from the number who seek admission into it, knowing how well they are nursed and attended. During the past year there have been 389 admitted; 234 of these

have been parturition cases, 5 scarlet fever, 69 measles, 10 pulmonary affections, and 71 from all other causes. The deaths have been—6 women and 5 children, viz. :— *United Kingdom.*

Of Women.		Of Children.	
Abortus	1	Phthisis Pulmonalis ..	1
Partus	1	Diarrhœa	1
Pyœmia	1	Convulsio	1
Phthisis Pulmonalis ..	2	Meningitis	1
Cancer of Uterus ..	1	Hydrocephalus.. ..	1
Total	6	Total	5

The Western District (Plymouth and Devonport).

The Principal Medical Officer reports—Venereal diseases have still furnished a very large proportion of the cases, although there is a slight diminution in this respect as compared with last year.

That more positive results have not to be recorded amongst the soldiers from the working of the Contagious Diseases Prevention Act is to be attributed to the frequent changes among the troops in garrison, and more especially to the practice of locating regiments immediately on their return from foreign service, when the men have unusual funds at their disposal, in a large seaport town like that of Plymouth. This has been already brought to notice by Deputy Inspector-General Annesley.

The Lock accommodation provided at the Royal Albert Hospital has been increased during the past year from 38 to 62 beds, and considerable additions are now in progress, which will admit of from 140 to 150 beds being made available for venereal cases. The opinion which was expressed last year, that we should see the earliest and best results of the Act at that place where the amount of hospital accommodation provided by the Government had been the amplest, has been fulfilled at this station, where great efforts have been made to cope with the progress of this class of diseases. To render the Act as effective as it might be, it is necessary that Lock accommodation be provided for the male civil population, nothing of the sort now existing; and also, that a clause be introduced into the Merchant Seamen's Health Act, rendering it compulsory on the part of the owners of ships to maintain, and provide medical treatment for their men when suffering from venereal, in the same way as when affected by any other disease.

The new Gymnasium was opened on the 30th November, 1866, since which date instruction has been regularly carried on among the men in garrison.

Four deaths from cholera occurred in the Plymouth Female Reformatory in the month of September. The outbreak was clearly traced to the leaking of sewage into the well used for drinking purposes. The unsatisfactory state of two open drains in the immediate vicinity of the Military Hospital has been frequently noticed by Deputy Inspector-General Annesley, in his monthly sanitary reports.

The faulty construction of the extraction shafts in the barrack-rooms in the Raglan Barracks has also been brought under the consideration of the authorities; and defective ventilation and other matters connected with the married quarters have likewise been reported upon. When the new forts are completed however, ample accommodation will be provided for any force likely to be stationed in the command.

The South-Western District.

The Principal Medical Officer, Dr. Francis Innes, C.B., reports that the health of the troops during 1866 was considerably better than the average of former years, and much better than that of the civil population during July, August and September especially, when the town suffered severely from epidemic cholera, which infested the poorer localities, and clung with extreme tenacity and fatality to certain houses where cesspit privies were in common use.

United Kingdom.

During the whole epidemic season, though cholera prevailed in close proximity to certain barracks, the health of the troops continued good. One man and one woman only died from the disease, and, with this exception, the troops enjoyed a remarkable exemption, not only from bowel complaints, but from all miasmatic disease. This result was probably due to the care and attention with which the sanitary and precautionary measures recommended in the War Office "Instructions" were carried out.

The insanitary condition of Portsmouth and its vicinity, described in previous reports, remains unaltered; but the new drainage scheme, by which the whole sewage of the borough will be emptied into the sea, at a distance of three miles from the town, is rapidly progressing, and when completed will, it is hoped, make Portsmouth one of the best drained towns in the kingdom.

Numerous sanitary improvements of a minor character have been effected in this district during the year; and extensive changes in drainage and water-supply are projected at Parkhurst, and also at Winchester, where cesspits exist and the sewerage is very bad.

Many of the Barracks at Portsmouth, as well as those at Dorchester and Chichester are so old and badly constructed, as not to admit, however, of the requisite sanitary changes being effected, and it is only by the erection of new buildings in suitable localities that the requirements of the command can be adequately met. Several important recommendations have been made regarding the sanitary improvement of the barracks and forts at Gosport, some of which have been included in the Annual Estimates.

South-Eastern District and Shorncliffe Camp.

Nothing has transpired during the year affecting their sanitary condition in any material respect. The various defects connected with the barrack buildings at Dover have been referred to in the reports of previous years. The latrines and urinals at the Western Heights, and some of those at the casemates in the Citadel are very objectionable; their position alone being sufficient at the latter place to render them so.

Chatham District.

Dr. Fraser, Depnty Inspector-General of Hospitals, repeats some of the objections which he expressed last year on the site and construction of some of the barracks within this district. The buildings are generally old and not at all in accordance with modern views, although they may, doubtless, be improved by the alterations in progress.

Ventilation.—In 1864, Dr. Fraser recommended the more or less entire removal of the partition wall separating the front and back rooms in Chatham Barracks. This measure is now in progress experimentally in "J" House. It is not alluded to by the surgeons of the 1st or 2nd Depôt Battalions, he presumes, because they consider there has not been time to test it. He concurs with the Surgeons of the Royal Engineers and Royal Artillery at Sheerness, in recommending its application to their barracks.

The Lavatories are, in Dr. Fraser's opinion, ill-drained; the floors not being sufficiently sloped, and, in consequence, always damp and sloppy. He recommends their reconstruction on improved principles. He also directs attention to the fact that, though a certain allowance of coal is granted for bath-rooms, yet there is only one instance in the district where hot water is provided, viz., in the 3rd Depôt Battalion. Dr. Fraser would urge that measures be adopted for providing a certain amount of hot water weekly in every corps, especially in winter, as a sanitary measure of importance in relation to cleanliness.

Latrines, Drainage, &c.—The Surgeon of the Royal Engineers points out that both the position and the construction of the latrines in the Royal Engineers' Barracks are objectionable, and recommends their reconstruction on modern principles, and their further removal from the rooms. A part of this measure was in progress. Dr. Fraser suggests the entire removal of the school latrines from such objectionable proximity to the Female Hospital. Additional water latrines have been substituted for old ones in the Lower

Chatham Barracks, the Depôt Battalion guard-room, and the garrison cells, and also at St. Mary's Casemates, 3rd Depôt Battalion; at this latter barracks some improvements have been made in the sewerage, and various suggestions have been offered with a view to the improvement of the inherent defects in the casemates. *United Kingdom.*

Warming and ventilation have both been improved in the Lock-up at Sheerness, by opening the wall a few feet above the ground and inserting a guarded stove.

The Milton Barracks at Gravesend consist of brick-built huts, and are reported by the medical officer as very good in respect to position, construction and arrangement. An ablution-room is attached to each hut. There is also an excellent bath-house, with separate baths.

At Tilbury there is an ordinary ablution-room. An excellent bath-room has been built during the year. At New Town Fort there is a common ablution-room, but no bath-house. Bathing parades are not possible at this station. Ventilation has been improved at Tilbury and New Tavern Forts, by the erection of fresh air inlets, foul air outlet shafts, and warm air grates; but the barracks at both places are old and ill-constructed.

Intermittent fevers have, as usual, prevailed to a certain extent among the men stationed at Tilbury. The cases have been generally, however, of a mild type, and marked by no special characteristic. The cause is, of course, the flat and marshy nature of the surrounding country. There has been no overcrowding, nor any defective ventilation or drainage, and no diseases attributable to such causes have occurred.

Woolwich Garrison.

No sanitary changes, beyond those of a minor character, have been carried out during the year. The barrack accommodation has nearly equalled that recommended by the Army Sanitary Committee, the exception being in the case of the B Brigade, Royal Horse Artillery, the 5th, 17th, and 2nd Division Depôt Brigades Royal Artillery, where it has ranged from 452 to 528 cubic feet of space per man. The accommodation for married soldiers is in many instances indifferent, and the condition of the brick cottages is said to be unsatisfactory in drainage and other respects.

Northern District.

Deputy Inspector-General Dr. Bent reports:—that he has personally examined every objectionable spot where sanitary defects had been indicated by medical officers in the district, and the following is the result of his observations:—

1. At Fleetwood, Deputy Inspector-General Scott reports that "the causes "which principally tend to affect the health of the troops are exposure to wet "and cold at rifle practice during the winter months," and also "defective "drainage and sewerage in the vicinity of, and in connection with, the huts"; also, that no useful improvements have been effected in the drainage in the vicinity of these huts during the past year, though frequent attempts were made.

With reference to this, the Commanding Royal Engineer and Dr. Bent made an inspection of the locality, when it appeared that a great local difficulty to effectual drainage existed—the land being below the sea level at high water. The drain complained of is carried under cover across a boundary road, and discharges into an opposite field, where it runs some little distance outside the hedge, and thence into a pond, where its products are utilised by the farmer.

In the summer it is offensive, and this may be corrected by its being covered in as far as the pond referred to. The Engineer Department has undertaken to do this, and by the return of warm weather the proposed measure will have been carried out.

The exposure to weather spoken of during the practice at the butts is incidental to the nature of the duty carried on in an open level piece of ground, where shelter is unattainable, except by the construction of sheds for the

United Kingdom.

firing parties to stand in. This was not recommended, however, as no serious interference with the health of the troops had been occasioned.

2. At the Cavalry Barracks, Hulme, Surgeon-Major Jee, 1st Royal Dragoons, remarks upon the defective drainage of the Hospital Latrines, and this is undoubtedly objectionable; but large alterations have been placed in the estimates for the ensuing year by the Engineer Department, which involve an entire reconstruction of the latrines and sewers. When these are effected, Dr. Bent does not think there will be much to complain of in the building, which is, for an old hospital in a crowded city, tolerably commodious and well ventilated.

3. At Tynemouth, there is a small antiquated fort, "Clifford," at mouth of the river, in which a few married families of the Coast Brigade quartered. From its situation, in the filthiest part of the town, it can never be a healthy spot. The only cases of cholera, two in number, among the troops in the autumn, occurred at this place, one of which proved fatal. All that can be done in the way of precaution against disease, Dr. Bent believes is being done—the numbers of inmates are kept down to a minimum, and within the enclosure every impurity is carefully removed. Military reasons require that the place should be occupied.

With respect to sanitary improvements in progress throughout the district, little remains to be added. Besides the sanitary improvements above indicated, there are alterations taking place in the latrines of the Cavalry Barracks at Coventry, some repairs of barrack-rooms, and an arrangement for better warming the cells at Northampton.

Eastern District.

Dr. Dane, reporting from Colchester, calls attention to the recommendation of Surgeon-Major Jephson, 1st King's Dragoon Guards, for placing stoves in the Cavalry Barrack-rooms, the necessity for the erection and use of which he had himself already represented.

Dr. Dane concurs with the surgeon of the 4th Depôt Battalion, that the present system of issuing coal in proportion to the number of men occupying the huts is defective; the stove in each hut should, he thinks, regulate the issue, and a good fire should be kept in it without reference to the number of men; at times a hut may be almost empty, and the few men in it suffering from cold owing to the small supply of coal at their disposal.

An order had been received from the War Department, that four married families only should be accommodated in any one camp hut in future. This will require some slight alteration in the construction of the few lately occupied by eight, seven, or five families.

Recommendations (supported by the Commandant) have been made to improve the surface drainage of the camp, where it is slightly defective, and also of the vicinity of the Cavalry Barracks, where considerable improvement is still necessary, though much has been done by the Royal Engineer Department in the past year.

North Britain.

Inspector-General Dr. M'Illree reports that, during 1866, the accommodation in the various barracks occupied by troops in North Britain has been re-appropriated, with a view of allotting 600 cubic feet to each man; but this very desirable provision could only be carried out by the local authorities in exceptional instances, on account of the disproportion at certain stations, such as Edinburgh Castle and Aberdeen, between the amount of available barrack space at command and the number of men to be accommodated.

Several important sanitary alterations and changes in barracks, &c., have been completed during the year.

The most important are the following:—

Edinburgh Castle.—New means of ventilation and warming in the guard-room. Provided with new cells and dry-room attached; also, new water latrines and stone urinals in the same enclosure. Canteen privy converted

into water latrines, with new slate urinal; and every urinal at the Castle supplied with a constant flow of water with new slate. *United Kingdom.*

Leith Fort.—Four Staff-Sergeants' rooms improved in ventilation and warming; a weather-bound skittle-ground erected, and lighted with gas.

Piershill Barracks.—Objectionable barrack privies removed, and the open ditch in the neighbourhood improved; a water latrine supplied to canteen; means of ablution added to hospital.

Stirling Castle.—A new ball-alley erected for men; increased accommodation provided for the hospital staff; also hospital store-room.

Fort George.—Some improvement in the general drainage of barracks, and the ventilation of barrack-rooms effected.

Aberdeen.—A new armourer's shop built; barrack kitchens supplied with Dean's patent; other minor improvements.

Hamilton.—The new plan for ventilation and warming introduced into Cavalry Barracks; privy altered into a water latrine, and a water urinal (stone) made in Militia Barracks.

Ayr.—Privy in hospital yard converted into water latrine, and a new water urinal added.

Dr. M'Illree states that at no former period as far back as office statistics extend, have the troops stationed in North Britain enjoyed a higher standard of health than during 1866, and this fact is the more remarkable, inasmuch as during the past year epidemic cholera prevailed amongst the civil population, particularly in the large towns and neighbouring districts occupied by troops. In no instance has the epidemic extended to the military residents.

Among the old constructed military buildings in North Britain, many grave sanitary defects are obvious enough, particularly when contrasted with buildings erected on the latest recognised principles, for the security of the health and comfort of men massed together in quarters.

The "New Barracks" at Edinburgh Castle are an instance of defective original construction for the purposes intended. In a sanitary point of view, this is aggravated by the various uses to which this building is, of necessity and for want of better means, appropriated. The garret stories are occupied by officers' quarters and mess, together with numerous families of married soldiers; and a portion of the under-flats are separated by side partitions. The intervening flats of this seven-storied building are appropriated to the men,—completing an uncomfortable and inappropriate arrangement.

Ireland.

Dublin Division.—The space in barracks at Dublin is reported by Deputy Inspector-General Gammie to be appropriated on the old scale laid down in the Barrack regulations, and the doors are marked for certain numbers, by which the occupation is regulated. The due allowance of cubic space on the new scale has been recommended, but the recent Fenian disturbances have tended to aggravate the existing condition, in consequence of the increased number of troops required in the station, and have prevented any re-appropriation being carried out. Some of the barracks in this command are old, ill-constructed, and their condition is in other respects unsatisfactory; and the same may be said of the regimental hospitals. Various propositions have been made from time to time in reference to these defects.

Curragh Camp and Newbridge.—Towards the end of the autumn of 1866, cholera visited a portion of the command; some of the men belonging to the mounted troops were attacked, and three deaths took place, one in the camp at Curragh and two at Newbridge.

Great attention was given to sanitary arrangements, and a partial removal of troops from Newbridge took place with apparently very beneficial results. The disease prevailed to a considerable extent in Newbridge itself, and in a village about half a mile distant.

During the year a sergeant of the 1st Battalion 3rd Regiment contracted scarlatina, and died in consequence. This death occurred when the corps was under orders for India, and necessitated, among other measures, the encampment of the regiment for a short time before embarkation.

United Kingdom.

The diseases most prevalent during the year were those of the enthetic order.

Several improvements of a minor character were introduced into the buildings and outhouses at the Curragh during the year.

At Newbridge, new family quarters for 48 occupants were completed and opened in August 1866. These are favourably reported on. The kitchens were fitted with new steel ovens and boilers, which work very well. The outfall sewer into the Liffey was improved, and the river in its neighbourhood deepened.

It is proposed to reappropriate the quarters of the troops at Newbridge and in camp, with the view of approximating as nearly as possible to the standard space of 600 cubic feet per man.

The water supply at Newbridge is not quite satisfactory, especially at the wells made for the use of the lavatories. In consequence of the supply being restricted, and requiring to be obtained by considerable manual labour, Deputy Inspector-General Dr. McGregor thinks the dry system of conservancy will be best adapted for the hospitals, and for the barrack latrines of the old cesspool construction.

The use of peat charcoal in camp and at Newbridge has been of marked benefit in preventing offensive effluvia.

At the contractors' deodorizing sheds on the Curragh it is freely used, and produces a satisfactory result, by rendering the solid material inodorous.

The following recommendations have been made by Deputy Inspector-General Dr. Chambers in his Sanitary Report of the Cork District:—

Ballincollig.—Reconstruction of latrines, urinals, and ash-pits; gas for barracks and stables; two lavatories, with bath-room and wash-house.

Bandon.—An ablution-room and women's wash-house.

Buttevant.—Urinals in different parts of the barracks (there is only one at present); drain in front of cook-house and married quarters wanted.

Clonmel.—Ovens for soldier's cook-houses; ventilation of soldier's and women's latrines require improvement, as also the surface drainage of barracks: a wash-house, recreation room, married quarters, and lavatory required.

Cahir.—New lavatories and bath-room recommended for barracks, and water-closets for hospital.

Cork.—Increased wash-house accommodation, and separation of ash-pit from privy cesspit.

Spike Island.—Women's wash-house recommended to be enlarged.

Charles Fort.—A pump for the well in the ditch of the fort, and an additional tank in front of canteen and cottages.

Carlisle Fort.—An ablution-room required.

Queenstown.—Women's privy required for General Hospital.

Carrick-on-Suir.—Ovens for baking for 50 men recommended; improvement of hospital accommodation; bath and ablution-rooms required.

Kinsale.—Water laid on to hospital ablution-room and kitchen; sink for hospital kitchen, and urinal and sink for hospital yard.

Limerick.—Re-construction of latrines and flushing of privies recommended; bath-rooms for men and women; ash-pits to be done away with in the new barracks, and carts substituted.

Wexford.—Soldier's lavatory, women's privy, and means of roasting for barracks; a urinal for the hospital.

Bantry.—A store in each barrack-room, and urinal in yard.

Clogheen.—Additional water-tanks, and soldier's ablution-room.

Clare Castle.—Women's wash-house requires to be enlarged, and ovens for cook-house fitted.

Youghal.—Soldier's wash-house required.

Rocky Island.—Washing-shed required.

Kilkenny.—Ground requires to be raised in hospital yard to carry off water; dirty bedding store required.

Templemore.—Increased water supply required, with wash-house accommodation; ventilation of hospital ward.

The Contagious Diseases Act.

United Kingdom.

THIS Act was an amended form of that passed in 1864, which it superseded. The operation of the first Bill was found to be attended with so many difficulties, owing to the limited powers conferred by it, that it was considered very little good would result. The time during which the Amended Bill has been in operation prevents our drawing any deductions from the experience of 1866; but it is well known that this has been very encouraging at those stations where its operation admitted of being fairly tested. The experience obtained in Belgium, at Mayence, in Malta, and Gibraltar, made it obvious that the prevalence of these diseases was a matter within our control, if the subjects of them were placed under a similarly strict surveillance. But it soon became clear that the limited application of the Act would defeat its objects, and that the mere erection of a Lock Hospital in any neighbourhood would rather tend to attract the sufferers from these diseases to the places where there existed the best chance of attention being paid to their wants and sufferings.

We were likewise applying measures to some insignificant tributary, while the larger currents remained free. Unfortunately, too, the subject was approached from its moral or religious, instead of its physical aspect; and many persons entertained a reluctance to enter upon any plan of legislative enactment; rather, on the contrary, the subject was ignored, although the facts were everywhere forcing themselves on our notice, and maintaining a position of scandalous notoriety.

Acts of Parliament, of course, can neither enforce morality, nor prevent crime; but they can do a great deal towards diminishing mortality and sickness, by prohibiting the sources of contagion from spreading diseases, and by confining them in hospitals until cured.

Persons out of the army can form but little idea of the amount of disease, and the modifications of health induced by syphilis. Military hospitals in many garrisons of various parts of the world would be comparatively empty were it not for diseases of this and a similar nature. The number of Lock Hospitals in this country, and the means for the treatment of diseases so highly contagious are very small and inadequate. The seamen composing the mercantile marine are equally exposed, with the men of our army and navy, to these diseases, without any provision being made for their detention and reatment on shipboard, or in hospitals at commercial ports. The disease is consequently often allowed to run its course unchecked, and to be propagated so as to compromise the health of the civil population.

A very wholesome change has taken place in public opinion within the last few years, and there now appears to be every disposition to extend the Act of 1866 beyond the limits of a few garrison towns and camps, and there is very little doubt that this would soon be done if it were not for the grave financial difficulties with which the design is encumbered.

The pay, position, and comfort of soldiers within the last few years have been so vastly improved in every respect, that the army, as a livelihood, may be said to compete with other methods on fairer terms than it has ever done before, and we may, therefore, expect the quality, as well as the number of recruits, to improve.

It would, however, be Utopian to suppose that we shall be able to eradicate evils of this nature by any efforts directed only to the education and amusement of the soldier. No doubt we have here done much, but we must not forget that diseases arising from immoralities are common enough among persons as far removed from the soldier in these respects as possible. If not so common, the one class obviously possess means by which they can more easily guard against, and escape these evils than the other.

The life of a soldier is altogether peculiar: he enters the army as a very young man, and is not an old one when he leaves it. During this period the passions are not by any means at their weakest, and the soldier leads a life of enforced celibacy for the benefit of the State. It would be incompatible with the nature of his occupation for every soldier to be married, even were it practicable to find sufficient barrack accommodation. Every one will perceive that such a state of things is likely to entail a good deal of immorality.

Section II.

On the Extent of Invaliding.

United Kingdom. The following Table shows the number of discharges by invaliding from the troops serving in the United Kingdom, and from each arm of the service during the year 1866.

	Troops generally.	Household Cavalry.	Dragoon Guards and Dragoons.	Royal Artillery (including the Depôt Brigade.)	Military Train.	Foot Guards.	Infantry Regiments.	Cavalry Depôt.	Depôt Battalions.
Strength	70,292	1,209	7,694	10,479	1,422	5,524	19,545	1,020	12,856
1866.. Number discharged as Invalids	2,118	26	215	342	32	128	516	37	493
1866.. Ratio per 1,000 ..	30·13	21·51	27·94	32·64	22·50	23·17	26·40	36·26	38·32
1860-65, Ratio per 1,000	38·07	13·68	30·87	25·87	26·47	31·78	30·26	39·04	43·24

This Table shows the invaliding in 1866 to have been under the average of the six preceding years in all the arms except the Household Cavalry, in which the previous ratio was exceptionally low, and the Royal Artillery. The influence of the various classes of diseases, as causes of invaliding in the different arms, has been shown in the preceding section of this report.

Section III.

On the Number constantly Sick in Hospital of the Troops serving in the United Kingdom.

The proportion constantly sick, the average sick term to each soldier, and the average duration of the cases in hospital during the year 1866, and on the average of the six preceding years, are shown in the following Table :—

		Troops generally.	Household Cavalry.	Cavalry of the Line.	Royal Artillery.	Military Train.	Foot Guards.	Infantry Regiments.	Cavalry Depôts.	Depôt Brigade Royal Artillery.	Depôt Battalions.
Mean daily sick per 1,000 of strength ..	1866..	41·85	28·12	34·09	43·17	39·91	44·24	37·04	50·71	43·30	36·14
	1860-5	51·26	32·60	44·17	51·64	52·89	53·85	44·44	58·55	63·56	49·09
		Days.	Days.	Days.	Days.	Days.	Days.	Days.	Days.	Days.	Days.
Average sick time to each Man in the course of the Year	1866	15·28	10·26	12·44	15·76	14·57	16·15	13·52	18·51	15·80	13·19
	1860-5	18·71	11·90	16·12	18·86	19·30	19·66	16·22	21·37	23·20	17·89
Average duration of the Cases	1866	17·91	16·63	17·84	18·43	17·35	22·20	17·88	15·64	16·45	16·57
	1860-5	18·84	19·07	17·21	19·19	18·98	22·65	19·50	17·41	20·48	18·10

With the exception of a slight increase in the duration of the cases in the Cavalry there has been a reduction in the mean daily sick, the average sick time to each man, and the average duration of the cases in all the arms, compared with the mean of the six preceding years. Compared, however, with the results for 1865, there has been a slight increase in the mean sick of the Depôt Brigade, R.A., and the duration of the cases has been rather longer in the Cavalry, Artillery, Foot Guards, and Depôt Battalions. It is probable that the marked reduction in the duration, compared with the average of the period 1860–65, has been the result of the alteration in the system of invaliding, pointed out in a preceding part of this report (p. 8), as men labouring under chronic disease, who are never likely to become again efficient, are retained a much shorter period awaiting their discharge, than under the old system. *United Kingdom.*

Section IV.

On the Influence of Age on the Mortality of Troops serving in the United Kingdom.

Abstract No. III. of Appendix shows the average strength of the troops, in the different arms of the Service, according to age classified in quinquennial periods, and the deaths at each period of life. The proportion of deaths per 1,000 of strength at each age, is stated in the following Table :—

Corps.	Annual Ratio of Deaths per 1,000 Living at the following Ages :—					
	Under 20.	20 and under 25.	25 and under 30.	30 and under 35.	35 and under 40.	40 and upwards.
Household Cavalry	..	2·43	7·09	10·20	7·94	16·81
Dragoon Guards and Dragoons	4·57	5·13	5·99	18·28	11·21	26·67
Royal Artillery	4·06	9·66	6·90	18·55	17·82	25·00
Military Train	..	4·97	10·20	10·69	..	..
Foot Guards	1·99	5·78	7·87	9·41	14·12	16·95
Infantry Regiments	2·23	4·64	7·87	7·75	19·68	28·93
Cavalry Depôts, Depôt and Coast Brigades Royal Artillery, and Depôt Battalions	4·47	6·91	13·71	14·11	21·65	24·76
Ditto, ditto, 1859-65	5·43	9·03	11·59	16·95	24·21	29·80
Average of preceding, exclusive of all Depôts.	2·56	5·46	7·35	12·45	16·88	24·52
Ditto, ditto, 1859-65	3·06	5·80	7·99	12·03	15·89	18·94
Civil Male Population { England and Wales ..	7·41	8·42	9·21	10·23	11·63	13·55
Civil Male Population { Healthy Districts. ..	5·83	7·30	7·93	8·36	9·00	9·86

The mortality at the ages under 30 has been a little lower than the average of the seven preceding years, and than that of the civil population in healthy districts, but it has been above both at the subsequent periods of life. The mortality at all ages at the Depôts exceeds the proportion in the rest of the Force ; a result no doubt due to the number of men in the former whose constitutions have been impaired by service in unhealthy climates.

Section V.

On the Recruiting of the Army.

United Kingdom. The Returns for 1866 show a total of 20,410 recruits primarily inspected; of these 8,918 were inspected at the head-quarters of the recruiting districts, 4,356 at regiments and depôts, and 7,136 by civil medical practitioners. The number rejected as unfit for military service was 6,811 at the primary, and 950 at the secondary inspections, making a total of 7,761, or 380·2 per 1,000 of the recruits. Compared with the results in 1865, this ratio shows a reduction of 46 per 1,000 in the rejections.

The rejections at the primary and secondary inspections of the recruits examined by army medical officers and civil practitioners respectively are shown in the following Table :—

	Number of Recruits Primarily Inspected.	Number Rejected.			Ratio of Rejections per 1,000 Examined.	
		Primary Inspections.	Secondary Inspections.	Total.	Primary Inspections.	Primary and Secondary Inspections.
At Head-Quarters of Recruiting Districts	8,918	3,489	208	5,167	391·2	389·3
At Regiments and Depôts	4,356	1,470			337·4	
By Civil Medical Practitioners ..	7,136	1,852	742	2,594	259·5	363·5
Total	20,410	6,811	950	7,761	333·7	380·2

There has been a reduction in the proportion of rejections at the primary inspections, compared with 1865, to nearly the same extent in the recruits examined at the head-quarters of districts, and by civil practitioners, and to a somewhat less amount at regiments and depôts. The rejections at primary inspections by army medical officers compared with those by civil practitioners have been in the proportion of 373 to 260, but when those at the secondary inspections are added to each, the difference in the results amounts only to 26 per 1,000. Of 8,315 recruits passed at the primary inspections by army medical officers, 208 were subsequently rejected, while of 5,384 passed by civil medical practioners, 742 were rejected, these numbers being respectively in the ratio of 25 and 140 per 1,000 of the recruits found fit in the first instance. These results show a lower ratio of rejections in both groups than in the preceding year.

The following Table, framed from Abstract No. IV. of Appendix, shows the number of recruits inspected, and the proportion rejected at the head-quarters of each of the recruiting districts :—

United Kingdom.

Districts.	Total Number Inspected.		Ratio found Unfit per 1,000 Inspected.	
	Primary Inspections.	Secondary Inspections.	Primary Inspections.	Secondary Inspections.
London	4,020	2,435	350	119
Liverpool	1,438	513	446	134
Bristol	259	452	262	254
Leeds	321	246	464	313
Edinburgh*	149	48	403	104
Glasgow..	730	183	460	158
Dublin	1,496	292	384	92
Cork*	64	..	422	..
Belfast	441	199	508	206
Total.. ..	8,918	4,368	[illegible]	[illegible]
Ratio in 1865	..	..	439	178

The proportion rejected both at primary and secondary inspections has been lower than in 1865. The highest ratio of rejections at the primary inspection was at Belfast. Leeds was next, and had the highest ratio at the secondary inspection. Glasgow and Liverpool both greatly exceeded the average at the primary, but closely approximated to it at the secondary inspections.

The following Table shows the native countries of the recruits inspected, and the number from each country found unfit for military service :—

Native Countries of Recruits.	Head-Quarters of Recruiting Districts.		Head-Quarters of Regiments and Depôts.		By Civil Medical Practitioners.		Subsequently Rejected on Secondary Inspection.		Total.		Proportion Rejected per 1,000 Inspected.
	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.	Of those who had been found fit by Army Surgeons.	Of those who had been found fit by Civilians.	Primarily Inspected.	Rejected at Primary and Secondary Inspections.	
England	5,076	1,892	3,170	1,048	5,669	1,450	132	565	13,935	5,087	365·9
Wales	63	24	35	13	188	52	4	26	286	119	416·1
Scotland	826	353	378	145	392	107	21	38	1,595	664	416·0
Ireland	2,917	1,208	707	250	853	241	49	110	4,477	1,858	415·0
British Colonies and Foreign Countries ...	36	12	66	14	14	2	2	3	116	33	284·5
Total ...	8,918	3,489	4,356	1,470	7,136	1,852	208	742	20,410	7,761	380·2

Compared with the results for 1865, these ratios show a marked decrease in the proportion rejected of the natives of England and Wales, a slight decrease of those of Ireland, and a slight increase of those of Scotland. The proportion rejected of the natives of British colonies and foreign countries was also lower, but the numbers are so small, and the circumstances under which they are enlisted so special as to prevent a fair comparison.

From the preceding Table we find the proportion of recruits furnished by each country to have been as follows :—

* On the 31st of March, 1866, the Edinburgh was consolidated with the Glasgow Recruiting District, and the Cork with the Dublin District. The numbers in this Table for Edinburgh and Cork are therefore only the Recruits raised in these Districts during the first quarter of the year.

United Kingdom.

By England and Wales	697	in every 1,000
Scotland	78	,,
Ireland	219	,,
Colonies and Foreign Countries ..	6	,,

There has been a considerable increase in the proportion of English, and a decrease in the Scotch and Irish recruits compared with the preceding year.

The numbers inspected for the different arms of the service, and the numbers found unfit, are shown in following Table :—

	Head-Quarters of Recruiting Districts.		Regiments and Depôt Battalions.		Inspected by Civil Medical Practitioners.		Total Primary Inspections.		Rejected on Secondary Inspection.	Total.		Ratio of Rejections per 1,000 Recruits Inspected.
	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.		Inspected.	Rejected.	
Household Cavalry	...	...	181	62	...	...	181	62	2	181	64	353·6
Cavalry of the Line and Military Train	1,392	578	339	87	472	119	2,203	784	91	2,203	875	397·2
Royal Artillery and Engineers	1,839	649	1,708	631	1,203	275	4,750	1,555	155	4,750	1,710	360·0
Foot Guards	64	23	250	102	797	203	1,111	328	138	1,111	466	419·4
Infantry Regiments and Depôts	5,623	2,239	1,878	588	4,664	1,255	12,165	4,082	564	12,165	4,646	382·8
Total	8,918	3,489	4,356	1,470	7,136	1,852	20,410	6,811	950	20,410	7,761	380·2

Compared with the results for 1865 there has been a slight increase in the proportion rejected for the Household Cavalry, and a considerable decrease in all the other arms, but especially in the Cavalry of the Line and Military Train. The Household Cavalry furnish the lowest, and the Foot Guards the highest ratio of rejections.

The following Table shows the classes of disabilities on account of which the recruits were deemed unfit for military service at the primary and secondary inspections :—

RETURN showing the Number of Recruits Rejected during the Year 1866, with the Causes arranged in Classes, and the Ratio per 1,000 in each Class.

Class.	Causes of Rejection, in Classes.	Primary Inspections.								Rejected on Secondary Inspection.		Total Rejected on both Primary and Secondary Inspection.					
		At Head-Quarters of Recruiting Districts.		At Head-Quarters of Regiments & Depôts.		By Civil Medical Practitioners.		Total.		Of Recruits previously examined by Army Medical Officers.	Of Recruits previously examined by Civilians.	Of Recruits examined by Army Medical Officers.		Of Recruits examined by Civil Medical Practitioners.		Total.	
		8,918		4,356		7,136		20,410				13,274		7,136		20,410	
		Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.			Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.
1	Syphilis	139	15·59	70	16·07	82	11·49	291	14·26	8	39	217	15·98	121	16·96	338	16·56
2	Other Zymotic Diseases	2	·22	15	3·44	17	2·38	34	1·67	..	1	17	1·25	18	2·52	35	1·71
3	Scrofula	114	12·78	33	7·60	24	3·36	171	8·38	10	20	157	11·56	44	6·17	201	9·85
4	Phthisis	34	3·81	30	6·90	45	6·31	109	5·34	4	12	68	5·01	57	7·99	125	6·12
5	Other Constitutional Diseases	43	4·82	11	2·52	28	3·92	82	4·02	9	11	63	4·64	39	5·47	102	5·00
6	Diseases of Brain, Spinal Cord, and Nerves	2	·22	2	·45	..	..	4	·20	..	1	4	·29	1	·14	5	·24
7	Diseases of Eyes and Eyelids	449	50·35	184	42·24	170	23·82	803	39·34	22	57	655	48·24	227	31·81	882	43·22
8	Diseases of Nose and Mouth	9	1·01	5	1·16	1	·14	15	·73	1	..	15	1·10	1	·14	16	·78
9	Diseases of Ears	8	·90	..	..	4	·56	12	·59	..	2	8	·59	6	·84	14	·68
10	Deafness	7	·79	4	·91	3	·42	14	·68	..	5	11	·81	8	1·12	19	·93
11	Impediment of Speech	19	2·13	2	·45	3	·42	24	1·18	..	1	21	1·55	4	·56	25	1·22
12	Disease of Heart	230	25·70	80	18·36	106	14·85	416	20·38	25	72	335	24·68	178	24·94	513	25·13
13	Disease of Arteries (Aneurism)	3	·33	2	·45	..	..	5	·24	1	..	6	·44	..	..	6	·29
14	Disease of Veins (Varix)	263	29·50	140	32·14	271	37·98	674	33·02	14	33	417	30·71	304	42·60	721	35·33
15	Disease of Lungs (except Phthisis)	21	2·36	29	6·66	32	4·48	82	4·02	1	10	51	3·76	42	5·89	93	4·56
16	Small or Malformed Chest, or Curvature of Spine	284	31·85	209	48·00	133	18·64	626	30·67	20	77	513	37·79	210	29·43	723	35·43

RETURN, &c.—*continued.*

Class.	Causes of Rejection, in Classes.	Primary Inspections.								Rejected on Secondary Inspection.		Total Rejected on both Primary and Secondary Inspection.					
		At Head-Quarters of Recruiting Districts.		At Head-Quarters of Regiments & Depôts.		By Civil Medical Practitioners.		Total.				Of Recruits examined by Army Medical Officers.		Of Recruits examined by Civil Medical Practitioners.		Total.	
		8,918		4,356		7,136		20,410				13,274		7,136		20,410	
		Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Of Recruits previously examined by Army Medical Officers.	Of Recruits previously examined by Civilians.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.
17	Loss or Decay of many Teeth	135	15·14	64	14·70	40	5·60	239	11·71	2	27	201	14·80	67	9·39	268	13·13
18	Hernia	82	9·19	50	11·45	145	20·32	277	13·57	4	14	136	10·02	159	22·28	295	14·45
19	Laxity of Abdominal Rings, showing tendency to Hernia	82	9·19	54	12·40	32	4·48	168	8·23	3	12	139	10·24	44	6·17	183	8·97
20	Hæmorrhoids	31	3·48	3	·68	16	2·24	50	2·45	..	5	34	2·50	21	2·94	55	2·69
21	Diseases of the Urinary Organs	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
22	Varicocele	174	19·51	106	24·33	200	28·03	480	23·52	12	50	292	21·51	250	35·03	542	26·55
23	Hydrocele	13	1·46	1	·23	4	·56	18	·88	..	1	14	1·03	5	·70	19	·93
24	Other Diseases of the Genital Organs (not Venereal)	29	3·25	2	·46	36	5·04	67	3·28	..	2	31	2·28	38	5·33	69	3·38
25	Muscular Tenuity	360	40·37	48	11·02	49	6·87	457	22·39	14	54	422	31·08	103	14·43	525	25·72
26	Debility	26	2·91	38	8·72	38	5·32	102	5·00	2	3	66	4·86	41	5·75	107	5·24
27	Defects of Upper Extremities, from Fracture, Contraction, Luxation, &c.	80	8·97	37	8·50	41	5·74	158	7·74	5	24	122	8·99	65	9·11	187	9·16
28	Defects of Lower Extremities, from Fracture, Contraction, Luxation, &c.	289	32·40	77	17·70	139	19·48	505	24·74	20	79	386	28·43	218	30·55	604	29·60
29	Diseases of Joints	12	1·34	2	·46	6	·84	20	·98	1	3	15	1·10	9	1·26	24	1·18

Class.	Causes of Rejection, in Classes.	Primary Inspections.								Rejected on Secondary Inspection.		Total Rejected on both Primary and Secondary Inspection.					
		At Head-Quarters of Recruiting Districts.		At Head-Quarters of Regiments & Depôts.		By Civil Medical Practitioners.		Total.		Of Recruits previously examined by Army Medical Officers.	Of Recruits previously examined by Civilians.	Of Recruits examined by Army Medical Officers.		Of Recruits examined by Civil Medical Practitioners.		Total.	
		8,918		4,350		7,136		20,410				13,274		7,136		20,410	
		Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.			Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.
30	Other Affections of Bones and Muscles ..	1	·11	16	3·67	11	1·54	28	1·37	..	10	17	1·25	21	2·94	38	1·86
31	Ulcers, Wounds, and Cicatrices	109	12·22	46	10·56	55	7·71	210	10·29	11	41	166	12·28	96	13·45	262	12·84
32	Other Affections of Cutaneous System ..	74	8·30	7	1·60	61	8·55	142	6·96	4	16	85	6·26	77	10·79	162	7·96
33	Weakness of Intellect	14	1·56	5	1·15	3	·42	22	1·08	3	..	22	1·62	3	·42	25	1·23
34	Malformation of Ears	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
35	„ Nose and Mouth	..	..	1	·23	..	..	1	·05	..	..	1	·07	..	..	1	·05
36	„ Chest and Spine	79	8·86	31	7·11	..	..	110	5·39	2	12	112	8·25	12	1·68	124	6·07
37	„ Urinary and Genital Organs	..	..	..	..	1	·14	1	·05	..	..	..	..	1	·14	1	·05
38	Marks of Punishment or letters D or B C..	20	2·24	5	1·15	6	·84	31	1·52	1	6	26	1·91	12	1·68	38	1·86
39	Unsound Health	252	28·26	61	14·00	50	7·01	363	17·79	9	42	322	23·72	92	12·89	414	20·28
	Total	3485	391·23	1470	337·47	1852	259·50	6,811	333·71	208	742	5167	380·55	2594	363·51	7,761	380·25

United Kingdom.

The proportion of rejections at primary inspections has not varied greatly from that in the preceding year for any of the principal disabilities. In defects of the lower extremities there has been a reduction of about 8 per 1,000; in "unsound health, marks of cupping, blistering, &c.," 6, and in loss or decay of many teeth, 5½ per 1,000. The decrease in the proportion rejected under the head of defects of the lower extremities has been well marked in the inspections both of military medical officers and civil practitioners; that in the rejections for "unsound health," and for "loss of teeth," is shown in the returns from the head-quarters of recruiting districts and from civil medical practitioners, but not in those from regiments and depôts. An increase in the rejections for "small or malformed chest" has been counterbalanced by a decrease in those for "malformation of chest and spine." There has been a reduction in the proportion rejected for varicose veins, which now stands second on the list in point of frequency of the causes of unfitness, diseases of the eyes and eyelids being first.

The proportion of recruits at each age in every 10,000 examined is shown in the following Table, framed from Abstract No. VI. of Appendix:—

Proportion in 10,000 Examined.	Boys under 17.	17 to 18.	18 to 19.	19 to 20.	20 to 21.	21 to 22.	22 to 23.	23 to 24.	24 to 25.	25 and upwards.
At Head Quarters Recruiting Districts ..	114	541	2,884	2,000	1,168	887	804	711	615	326
At Regiments and Depôts ..	379	967	3,052	1,741	1,250	871	645	514	360	221
By Civil Medical Practioners	49	576	3,208	1,790	1,317	936	786	622	618	98
Total ..	163	666	3,014	1,862	1,239	899	756	629	548	224

The enlistments under 18 years of age, and at 25 and upwards, were less numerous than in 1865; there was a considerable increase in the proportion between the ages of 18 and 20 years.

The proportion of recruits at each height in every 10,000 inspected is shown in the following Table framed from Abstract No. VII. of Appendix:—

Proportion in 10,000.	Inspected at Head-Quarters Recruiting Districts.	Inspected at Regiments and Depôts.	Inspected by Civil Medical Practitioners.	Total.
Ft. In. Ft. In.				
Under 5 3 ..	100	329	36	140
5 3 to 5 4 ..	164	255	13	139
5 4 „ 5 5 ..	1,632	1,565	645	1,292
5 5 „ 5 6 ..	3,090	2,408	2,968	2,869
5 6 „ 5 7 ..	2,168	1,639	2,297	2,069
5 7 „ 5 8 ..	1,415	1,352	1,750	1,508
5 8 „ 5 9 ..	790	1,014	1,164	972
5 9 „ 5 10 ..	377	660	621	532
6 10 „ 5 11 ..	170	259	289	232
5 11 „ 6 0 ..	72	271	129	143
6 0 and upwards	22	248	88	104

The proportion of men above 5 feet 9 inches was less than in 1865 at the head-quarters of recruiting districts, and among the recruits inspected by civil practitioners, but higher among those at regiments and depôts.

The following Table shows the results of the weights of the recruits per 10,000 inspected at the head-quarters of the districts. The details are given in

Abstract No. VIII. of Appendix. There is no available information respecting the men inspected at regiments and depôts, and by Civil Medical Practitioners. *United Kingdom.*

lbs.		lbs.		
Under 100				99
From 100	to	110		253
„ 110	to	120		2,134
„ 120	to	130		3,448
„ 130	to	140		2,411
„ 140	to	150		1,211
„ 150	to	160		318
„ 160	to	170		92
„ 170 and upwards				34
				10,000

Compared with the results for 1865, there has been a decrease in the proportion weighing less than 110 lbs., and more than 150 lbs., and of course a relative increase in the proportion between those weights, most marked between 110 and 130 lbs.

The following Table shows the state of education among the recruits, with the exception of those inspected by civil medical practitioners respecting whom we have no information. The numbers in each class are stated in Abstract No. IX. of Appendix.

Of every 1,000 Recruits Examined.	Unable to Read or Write.	Able to Read only.	Able to Read and Write.
At Head-Quarters of Recruiting Districts	233	84	683
At Regiments and Depôts	150	93	757
Total	206	87	707

This shows a larger proportion able to read and write than in 1865, but the results are not very gratifying, as one-fifth of the whole of the recruits examined are unable to read or write. There is obviously abundant scope for the labours of the regimental schoolmaster.

The occupations of the recruits inspected, and the number of each group who were rejected, are shown in the following Table :—

Occupations of Recruits.	Number Inspected.	Rejected on Primary Inspection.	Rejected on Secondary Inspection.	Total Rejected.	Ratio per 1,000 Rejected.
1. Labourers, Husbandmen, and Servants	12,437	4,002	533	4,535	364·6
2. Manufacturing Artisans (as Clothworkers, Weavers, Lace Makers, &c.)	2,932	1,056	117	1,173	400·1
3. Mechanics employed in Occupations favourable to physical development (as Carpenters, Smiths, Masons, &c.)	3,184	1,146	189	1,335	419·3
4. Shopmen and Clerks	1,292	464	31	495	383·1
5. Professional Occupations, Students	110	29	4	33	300·0
6. Boys	246	27	16	43	174·8
Information not given	209	87	60	147	..
Total	20,410	6,811	950	7,761	380·2

United Kingdom.

Compared with the results for 1865, there has been a marked reduction in the proportion rejected in all the classes except the third and sixth. The fifth class, or professional occupations, furnishes the lowest proportion of rejections with the exception of the boys, but the numbers are too small to justify any conclusions as to their exemption from disabilities.

The proportion of recruits furnished by each group of occupations was as follows:—

1. Labourers, Husbandmen, and Servants	609·4
2. Manufacturing Artizans (as Clothworkers, Weavers, Lace-makers, &c.)	143·7
3. Mechanics employed in occupations favourable to physical development (as Carpenters, Smiths, Masons, &c.) ..	156·0
4. Shopmen and Clerks	63·3
5. Professional occupations, Students	5·4
6. Boys	12·0
Not stated	10·2
Total	1000·0

The class of mechanics employed in occupations favourable to physical development has furnished a higher proportion than in 1865; labourers and shopmen and clerks have differed very slightly from the results of that year, and the other classes show a slight decrease.

II.—ON THE HEALTH OF THE TROOPS SERVING IN THE MEDITERRANEAN.

Section I.—Sickness and Mortality.

1.—GIBRALTAR.

STATISTICAL REPORT.

Gibraltar.

In the beginning of May the 17th Company Royal Engineers arrived from England, and in the end of the month the 31st Company from Malta. These two companies replaced the 27th and 33rd, which proceeded to Malta. Two Batteries of the 1st Brigade Royal Artillery embarked for the West Indies on the 4th of May, and towards the end of June the 2nd Battalion 23rd Regiment proceeded to Canada on the arrival at Gibraltar of the 87th Regiment from home.

The average strength of Non-commissioned Officers and Men during the year was 4,585. The admissions into hospital were 2,692 and the total deaths 20, of which 12 occurred in and 3 out of hospital, and the remaining 5 among invalids on their passage home, or at Netley while awaiting their discharge. These numbers give the annual ratio of 587 admissions, and 4·36 deaths per 1,000 mean strength.

The admissions and deaths in each corps are shown in the following Table :—

Corps.	Average Annual Strength.	Admitted into Hospital.	Died.				Ratio per 1,000.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Royal Artillery	650	374	3	..	1	3	575	6·16
Royal Engineers	293	204	2	..	..	2	696	6·83
2nd Battalion 15th Regiment ..	689	494	..	..	..	..	717	..
„ 23rd „ ..	342	157	2	..	2	4	459	11·67
32nd Regiment	752	382	2	..	..	2	507	2·66
78th „	706	401	1	2	1	4	568	5·67
86th „	723	410	1	1	1	3	567	4·15
87th „	384	262	1	..	..	1	682	6·83

The admissions into hospital were most numerous in the 15th Regiment, but it lost no men during the year by death, and even in it the ratio of admissions to the strength was under the average of the same class of troops in the United Kingdom.

The diseases by which the admissions into hospital and deaths were caused are stated in Abstract No. X. of Appendix. The following Table shows the influence of the different classes of diseases in 1866, and the average of the seven preceding years :—

Gibraltar.

Orders.	Diseases.	1866. Average Strength, 4,585. Admitted into Hospital.	Deaths. At Gibraltar.	Deaths. Of Invalids.	Total Died.	Annual ratio per 1,000 of Strength. Admitted.	Annual ratio per 1,000 of Strength. Died.	1859-65. Annual ratio per 1,000 of Strength. Admitted.	1859-65. Annual ratio per 1,000 of Strength. Died.	1866. Infantry at Home. Annual ratio per 1,000 of Strength. Admitted	1866. Infantry at Home. Annual ratio per 1,000 of Strength. Died.
	Class I.										
1	Miasmatic Diseases ..	683	3	..	3	149·0	·65	263·1	5·59	146·1	·97
2	Enthetic „ ..	715	..	..	..	155·9	..	184·1	..	239·4	·10
3	Dietic „ ..	37	..	..	..	8·1	..	13·2	·11	5·9	·05
4	Parasitic „ ..	19	..	..	..	4·1	..	7·4	..	33·4	..
	Class II.										
1	Diathetic Diseases ..	20	..	..	..	4·4	..	3·6	·11	2·6	·10
2	Tubercular „ ..	48	4	2	6	10·5	1·31	7·4	1·15	14·9	1·84
	Class III. Diseases of the—										
1	Nervous System ..	47	2	1	3	10·2	·65	18·3	·27	15·6	·51
2	Circulatory „ ..	20	4	1	5	4·4	1·09	6·8	·70	8·4	·92
3	Respiratory „ ..	185	1	..	1	40·4	·22	51·5	·38	81·2	·37
4	Digestive „ ..	110	..	..	..	24·0	..	36·2	·32	32·2	·62
5	Urinary „ ..	8	..	1	1	1·7	·22	2·4	·16	2·8	·31
6	Reproductive „ ..	70	..	..	..	15·3	..	16·7	..	10·1	..
7	Locomotive „ ..	16	..	..	..	3·5	..	4·5	·05	3·6	·05
8	Integumentary „ ..	389	..	..	..	84·8	..	121·0	..	91·3	·05
	Class IV.										
4	Diseases of Nutrition	3	..	..	..	·6	..	2·4	·03	2·3	..
	Class V.										
1	Accidents	317	1	..	1	69·1	·22	76·5	·40	63·2	·51
3	Homicide	..	..	..	..	..	..	..	·08	..	..
4	Suicide	1	..	..	..	·2	..	·2	·35	·3	·21
5	Execution	..	..	..	..	..	..	..	·08	..	·05
6	Corporal Punishment	4	..	..	..	·9	..	3·2	..	2·6	..
	Diseases not stated ..	..	..	..	..	..	..	2·0	..	..	..
	No appreciable Disease	..	..	..	..	..	..	·8	..	·3	..
	Total	2,692	15	5	20	587·1	4·36	821·3	9·78	756·2	7·16

The admissions and deaths have been considerably below the average, and the latter very much lower than in 1865. The difference has been chiefly in miasmatic diseases, and, as regards the deaths, has been due to the exemption from spasmodic cholera, which in the preceding year, had trebled the mortality.

The sickness and mortality have been lower than among the Infantry serving at home; the excess of admissions among the latter was chiefly in venereal and parasitic diseases and in those of the respiratory system, but the excess of the deaths was not confined to any particular class of diseases.

Miasmatic Diseases, when subdivided into groups, give the following results:—

Miasmatic Diseases.	Admitted.	Died.	Annual ratio per 1,000. 1866. Admitted.	1866. Died.	1859-65. Admitted.	1859-65. Died.
Eruptive Fevers	11	..	2·4	..	1·5	·13
Paroxysmal „	15	..	3·3	..	5·6	·11
Continued „	148	3	32·3	·65	84·7	2·18
Dysentery and Diarrhœa	92	..	20·1	..	58·6	1·08
Spasmodic Cholera	..	..	..	..	8·2	2·04
Sorethroat and Influenza	110	..	24·0	..	19·2	..
Ophthalmia	157	..	34·2	..	42·0	..
Rheumatism	125	..	27·3	..	37·2	·03

Eruptive Fevers have been above the average owing to the prevalence of small-pox, which caused 10 admissions; five occurred in the 2nd Battalion 15th Regiment. All the cases were mild, the men having satisfactory marks of previous vaccination.

Continued Fevers were considerably less prevalent than in 1865, and much below the average. The progressive reduction of this form of disease from year to year seems a natural result of the improvements in the ventilation of the barracks and the other sanitary ameliorations which have been in progress.

Dysentery and Diarrhœa gave rise to little more than one third of the average proportion of admissions. They were, however, in excess of the amount in 1864; this may, perhaps, have been a result of the very dry season, as the supply of water is stated to have been deficient and the quality bad. In 1865 the ratio of admissions by these diseases was above the average, their prevalence having been increased during the epidemic of cholera.

Spasmodic Cholera did not appear in the garrison during the year.

Ophthalmia was under the average of the seven preceding years. Upwards of half of the cases occurred in the 2nd Battalion 15th Regiment, and for the most part in men who had suffered from the disease when it was epidemic in the regiment in Malta. With this exception it did not prevail among the troops to any extent.

ENTHETIC DISEASES, though considerably below the average, have been rather more prevalent than in 1865. The increase has been chiefly in cases of syphilis.

ACCIDENTS AND VIOLENCE.—Only one fatal case occurred under this head, that of a man of the 23rd Regiment, who slipped while descending a stone stair and fractured his skull. There was no suicidal death during the year.

SANITARY REPORT.

The Principal Medical Officer, Dr. Rutherford, Deputy Inspector-General, says he does not find in any of the sanitary reports of the Medical Officers in charge of corps and detachments in this garrison, with the exception of that of the Surgeon of the 86th Regiment, any special causes alleged as productive of disease among the men, although nearly all refer, more or less, to the various insanitary defects existing in the respective barracks, and which have been so minutely detailed in the Report of the Barrack and Hospital Improvement Commissioners. Many of these defects have been, as far as possible, remedied, and improvements, in accordance with the recommendation of the Commission, are being gradually introduced; much, however, remains to be done, and a considerable time will probably elapse before the completion of these much-needed works.

Gibraltar.

In the report of the Surgeon of the 86th Regiment it is stated that the regiment suffered from continued and typhoid fevers in July, August, and September, from zymotic causes and overcrowding; the latter, in a great measure, unavoidable, as a certain amount of barrack accommodation—two large apartments—were in the hands of the Engineers, undergoing the necessary improvements.

The leading sanitary improvements during the year have been as follows:—

The men's guard-room, north front, has been considerably enlarged, and a new officers' guard-room provided. The drainage of Catalan Bay small barrack has been improved. The ventilation of the Casemate Barracks has been completed, and wooden flooring introduced. Similar improvements are being carried out in the Wellington front casemates. The new married quarters at Europa are approaching completion.

At the Garrison Hospital, a new dead-house has been erected: a new dispensary, &c., is being constructed on the site of the old one: the ventilation of the wards has been completed, and new flooring introduced into some of those on the ground floor. A small block of building has been added to the south end of the main building, to contain water-closets, baths, &c.; but until a proper water supply is introduced, these cannot be used.

There is very ample accommodation for the present sick of the garrison, and some wards are altogether vacant.

II.—MALTA.

STATISTICAL REPORT.

Malta.

In the middle of March the 1st Battalions of the 8th and 60th Regiments arrived at Malta from England and relieved the 2nd Battalion 4th and 1st Battalion 22nd, which proceeded to Nova Scotia and New Brunswick. In the middle of May two Companies Royal Engineers from Gibraltar replaced two Companies, one of which returned home and the other joined the garrison of Gibraltar, and in the middle of October the 1st Battalion 24th from England relieved the 100th Regiment, which embarked for Canada.

The average strength of the troops throughout the year, exclusive of the Royal Malta Fencibles, was 5,202; the admissions into hospital were 4,798; the deaths in hospital were 50, out of hospital 11, and among the invalids on their passage home and at Netley 6, making a total of 67. These numbers gave an annual ratio of 922 admissions and 12·88 deaths per 1,000 of mean strength, the former being considerably above and the latter nearly identical with the average of the seven preceding years, but both lower than the proportion in 1865.

The admissions into hospital and deaths in each Corps were as follows:—

Corps.	Average Annual Strength.	Admitted into Hospital.	Died.				Ratio per 1,000 of Strength.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Royal Artillery	760	561	13	2	..	15	738·2	19·74
Royal Engineers	182	180	2	..	..	2	989·0	10·99
2nd Battalion 4th Regiment ..	157	68	1	..	..	1	433·1	6·37
1st „ 8th „ ..	520	825	10	..	..	10	1586·5	19·23
2nd „ „ „ ..	751	569	1	3	..	4	757·7	5·33
1st „ 22nd „ ..	147	52	..	..	..	..	353·7	..
„ „ 24th „ ..	139	138	1	..	..	1	992·8	7·19
29th Regiment	716	460	6	4	2	12	642·5	16·76
1st Battalion 60th Regiment ..	513	669	1	..	..	1	1304·1	1·95
84th Regiment	702	667	10	..	4	14	948·8	19·91
100th „	509	568	4	2	..	6	1115·9	11·79

The other death was that of a Private of the Army Hospital Corps. *Malta.*

The sickness was considerably in excess in the 1st Battalion 8th and the 60th Regiments, both of which had arrived in the Island from England about the middle of March. The mortality was highest in the Royal Artillery, the 84th, 1st Battalion 8th, and 29th Regiments.

The influence of the different classes of diseases in producing sickness and mortality is shown in the following Table. The details for 1866 will be found in Abstract No. X. of Appendix.

Orders.	Diseases.	1866.—Strength, 5,202.						1859–65.	
		Admitted into Hospital.	Deaths.		Total Died.	Annual ratio per 1,000 of Strength.		Annual ratio per 1,000 of Strength.	
			In Malta.	Of Invalids.		Admitted.	Died.	Admitted.	Died.
	Class I.								
1	Miasmatic Diseases..	2,249	22	..	22	432·3	4·22	403·3	6·47
2	Enthetic „ ..	310	..	..	..	59·6	..	84·2	..
3	Dietic „ ..	88	..	..	..	16·9	..	12·4	·15
4	Parasitic „ ..	40	..	..	..	7·7	..	12·4	..
	Class II.								
1	Diathetic Diseases..	27	..	..	..	5·2	..	4·4	·12
2	Tubercular „ ..	61	10	4	14	11·7	2·69	10·4	1·76
	Class III. Diseases of the—								
1	Nervous System ..	112	1	..	1	21·5	·19	17·9	·57
2	Circulatory „ ..	75	11	1	12	14·4	2·30	6·8	·52
3	Respiratory „ ..	265	3	..	3	50·9	·57	45·3	·79
4	Digestive „ ..	270	3	..	3	51·9	·57	46·3	·62
5	Urinary „ ..	16	1	..	1	3·1	·19	2·1	·22
6	Reproductive „ ..	108	..	..	..	20·7	..	11·2	..
7	Locomotive „ ..	25	..	..	..	4·9	..	5·0	..
8	Integumentary „ ..	610	..	..	..	117·3	..	130·2	·05
	Class IV.								
4	Diseases of Nutrition.	79	..	1	1	15·2	·19	3 6	·03
	Class V.								
1	Accidents	447	8	..	8	85·9	1·57	82·5	1·09
3	Homicide	..	..	..	..	..	..	..	·03
4	Suicide	1	2	..	2	·2	·39	·2	·25
5	Execution	..	..	..	..	..	..	..	·05
6	Corporal Punishment	8	..	..	..	1·6	..	2·8	..
	No appreciable disease	7	..	..	..	1·3	..	1·7	..
	Diseases not stated ..	..	..	..	..	..	..	·1	..
	Total	4,798	61	6	67	922·3	12·88	882·8	12·72

The increased ratio of admissions into hospital was caused by miasmatic diseases; the excess of deaths was principally from tubercular diseases and those of the circulatory system. As compared with the results for 1865, both admissions and deaths by miasmatic diseases show a marked reduction.

Miasmatic Diseases, when sub-divided, give the following results :—

Diseases.	1866.		Annual Ratio per 1,000 of Strength.			
			1866.		1859–65.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Eruptive Fevers	4	..	·8	..	1·5	·10
Paroxysmal „	73	1	14·2	·19	3·3	..
Continued „	1,031	19	198·1	3·64	180·2	3·40
Dysentery and Diarrhœa	319	..	61·3	..	71·8	·74
Spasmodic Cholera	..	..	..	..	2·9	2·13
Sorethroat and Influenza	104	..	19·9	..	14·3	..
Ophthalmia	266	..	51·0	..	75·8	..
Rheumatism	387	..	74·4	..	46·3	·05

Paroxysmal Fevers.—The excess in the admissions by this group occurred exclusively in the 1st Battalion 8th Regiment, in which 68 cases and one death were recorded under the head of remittent fever. From the report of the surgeon, however, it seems doubtful whether they might not have been more correctly returned as continued fevers.

Continued Fevers were much more prevalent and fatal than on the average of the six years 1860-65. Indeed, if the 68 cases in the 8th Regiment above noticed be added to this group the admissions and deaths have been higher than in any of those years, though still much lower than in the epidemic of 1859. Omitting the 4th, 22nd, and 24th Regiments, which were not stationed in the Island during the months June–September when fever was prevalent, the admissions and deaths in each corps were as follows :—

	Mean Annual Strength.	Admitted for Fever.	Died of Fever.	Annual ratio per 1,000.		Barracks occupied by Corps.
				Admitted.	Died.	
Royal Artillery ..	760	105	3	138	3·95	Varicus.
„ Engineers ..	182	61	2	335	10·99	St. Francis Barracks, and Ravelin.
1st Batt. 8th Regt.	520	202	6	388	11·54	Isola Gate, S. Francesco di Paolo. and Isola Gate.
2nd „ „	752	120	1	160	1·33	Fort Manoel and Pembroke Camp.
29th Regiment ..	716	126	2	176	2·79	Fort Ricasoli.
1st Batt. 60th Regt.	513	150	..	292	..	Floriana Barracks.
84th Regiment ..	702	174	4	248	5·70	Lower St. Elmo.
100th „ ..	509	142	2	279	3·93	Fort Verdala, &c.

This table shows the prevalence of fevers to have been very general, none of the corps enjoying, as in previous epidemics, a marked exemption. The lowest ratio of admissions was in the Royal Artillery which was distributed, two batteries in Upper St. Elmo Barracks and one Battery at each of the following quarters: Forts Tigné, St. Salvatore, St. Angelo, and Ricasoli, St. James Cavalier, and Marsamuscetto. The highest ratio of admissions occurred in the 1st Battalion 8th Regiment and the Royal Engineers, both of which corps had arrived in the Island in March, the former from England and the latter from Gibraltar. The ratio was also high in the 60th, which came to Malta at the same time. The 100th Regiment in Fort Verdala had a large proportion of cases, which was attributed, by the surgeon of the regiment, chiefly to the defective ventilation and imperfect system of drainage of the

barrack, and the 84th in Lower St. Elmo Barracks also furnished a high ratio of cases and deaths. The fever was characterized by tedious convalescence and by the frequent occurrence of orchitis and rheumatism as sequels to it. *Malta.*

Dysentery and Diarrhœa, though still the cause of a considerable amount of sickness compared with the proportion at Gibraltar or in the United Kingdom, have been under the average of the preceding seven years and much lower than in 1865.*

Spasmodic Cholera did not attack the troops during the year.

Ophthalmia was much less prevalent than in any of the six preceding years and was slightly under the ratio in 1859. The disease was chiefly confined to the 1st and 2nd Battalions 8th Regiment and to the 100th Regiment. In the 1st Battalion 8th it first appeared among the women and children, and was believed to have been contracted from some Maltese with sore eyes, who were employed in the married quarters to assist the women in washing.

Rheumatism was greatly in excess of the average. It was in many instances the sequel of an attack of fever.

Enthetic Diseases.—Although the admissions for venereal diseases have been considerably under the average of the seven preceding years and below the amount in any of the other foreign stations, they show an increase of 15 per 1,000 on the ratio in 1865. The excess has occurred entirely in syphilis.

Tubercular Diseases.—The ratio of mortality by this class of diseases was considerably above the average of the seven preceding years, but this may probably be an accidental fluctuation dependent on the small numbers.

Diseases of the Circulatory System have also been greatly in excess of the average. Disease of the valves of the heart and palpitation, probably dependent on functional derangement, have been the most frequent causes of admission, while aneurism of the aorta and valvular disease of the heart have been the chief causes of death. One-third of the deaths by this class occurred in the Royal Artillery.

Diseases of Nutrition furnished an unusually large proportion of admissions. They were chiefly men who, after having recovered from attacks of fever, were unable to regain their strength, and being found unequal to their duty were taken into hospital under the head of *Asthenia*.

Accidental and Violent Deaths.—In this class are included four deaths from fracture of the skull, all occasioned by falls from the fortifications when the men were, it is believed, in a state of intoxication. There were also three deaths by drowning, from the upsetting of a boat. The remaining accidental death was that of a Private of the 60th Regiment, who, when in a state of intoxication, was run over by a car, and died the following day from rupture of the intestines, the result of the injury.

Two suicidal deaths occurred during the year, both by fire-arms. An unsuccessful attempt was made by a Serjeant of the Royal Artillery by means of corrosive sublimate.

Royal Malta Fencible Artillery.

The mean strength of the corps during the year was 598; the admissions into hospital were 488 and the deaths were 6, being respectively in the proportion of 816 and 10·03 per 1,000 of strength.

The following Table shows the admissions and deaths by the different classes of diseases. The details for 1866 will be found in Abstract No. X. of Appendix.

* Through a clerical error the ratio of admissions by these diseases in 1865 was stated in last report to be 48·4 instead of 118·4.

Malta.

Orders.	Diseases.	Average Strength.	Royal Malta Fencible Artillery. 598 Admitted.	Royal Malta Fencible Artillery. 598 Died.	Annual Ratio per 1,000. 1866. Admitted.	Annual Ratio per 1,000. 1866. Died.	Annual Ratio per 1,000. 1859–65. Admitted.	Annual Ratio per 1,000. 1859–65. Died.	Annual Ratio per 1,000 of Strength. Line Regiments at Malta. 1866 Admitted.	Annual Ratio per 1,000 of Strength. Line Regiments at Malta. 1866 Died.
	Class I.									
1	Miasmatic Diseases		219	..	366·2	..	275·5	2·40	432·3	4·22
2	Enthetic „		34	..	56·8	..	64·4	..	59·6	..
3	Dietic „		1	..	1·7	..	·5	..	16·9	..
4	Parasitic „		1	..	1·7	..	3·3	..	7·7	..
	Class II.									
1	Diathetic Diseases		..	..	..	..	2·9	·24	5·2	..
2	Tubercular „		5	3	8·4	5·02	3·1	1·20	11·7	2·69
	Class III. Diseases of the—									
1	Nervous System		7	1	11·7	1·67	13·7	·72	21·7	·19
2	Circulatory „		2	1	3·3	1·67	2·9	·71	14·4	2·30
3	Respiratory „		40	1	66·9	1·67	76·9	·24	50·9	·57
4	Digestive „		87	..	145·5	..	168·1	1·43	51·9	·57
5	Urinary „		..	..	..	..	1·7	..	3·1	·19
6	Reproductive „		3	..	5·0	..	2·2	..	20·7	..
7	Locomotive „		..	..	..	..	..	..	4·9	..
8	Integumentary „		47	..	78·6	..	147·1	..	117·1	..
	Class IV.									
4	Diseases of Nutrition		..	..	..	..	..	..	15·2	·19
	Class V.									
1	Accidents		42	..	70·2	..	86·9	1·20	85·9	1·57
3	Homicide		..	..	..	..	·2	·48	..	..
4	Suicide		..	..	..	..	·5	..	·2	·39
6	Corporal Punishment		..	..	..	..	·9	..	1·6	..
	No appreciable disease		..	..	..	..	..	..	1·3	..
	Total		488	6	816·0	10·03	850·8	8·62	922·3	12·88

The admissions have been under, but the deaths above, the average; they have both, however, been lower than among the troops of the Line, and much under the proportion in 1865.

Miasmatic Diseases have been above the average from the large number of cases of ophthalmia, which, as stated in last report, began to prevail as an epidemic in the Corps in August 1865, and which still continues to be a source of considerable inefficiency. During the year there were 139 admissions from it, being in the proportion of 232 per 1,000 of the strength. The corps appears to have enjoyed a perfect immunity from the fever which, as we have already seen, prevailed so much among the regiments of the Line.

The admissions from Diseases of the Digestive System were also very numerous, amounting to 87, of which 78 were returned under the head of *Dyspepsia.*

SANITARY REPORT.

Malta.

The sanitary condition of this station and its barrack accommodation have received so much attention on other occasions, that there is no necessity for entering upon the subject further than in its bearing upon the health of the troops specially affected during the year.

The Medical Officer of the 3rd Brigade Royal Artillery, directs attention to the sanitary improvement accomplished by the construction of the new docks at the head of the harbour, which are now approaching completion, replacing an unhealthy marsh, and embanking the water line. The men of the Brigade have occupied eight barracks; of these two only —viz., St. Elmo and Marsamuscetto—are in bad neighbourhoods. The barrack of the married detachments at Salvatore Counter-Guard, Floriana, is too closely walled in.

The Surgeon says the liquors chiefly used are Sicilian wine, porter, and ale. These have been supplied of good quality at the regimental canteen at St. Elmo, and by contractors at other forts. Very bad brandy and gin are drunk in the town by the men. The numerous severe and frequently fatal accidents compel him to assume that one-half the disease of the year has been caused, either directly or indirectly, by intemperance. The long residence of the brigade in one town prevents the men from shaking off bad habits, and forming healthier associations. Whether from prison or from hospital, the soldier finds himself again and again amidst the same temptations.

The Surgeon of the 1st Battalion 8th Regiment, in his report, remarks upon the sanitary defects existing in the barracks occupied by that corps, viz., Isola Gate, St. Francis di Paolo, and Polverista Gate Barracks. These have been adverted to in former reports, and are fully described in that on the sanitary condition of the Mediterranean Stations. The Surgeon, with the view of obviating the inadequate ventilation in the barrack-rooms, which he deemed otherwise irremediable from the peculiarity of construction, recommended that a proportion of the men from each barrack should be placed under canvas at night, so as to afford more space; the recommendation was carried out with very beneficial results.

At Polverista the ablution-room is fitted with Jennings's basins, but, in consequence of the force pump being out of order, there was seldom any water in the taps, and it had to be carried from a distance. At San Francisco and Isola Gate the means of personal ablution are very inadequate, consisting merely of metal basins, which are very difficult to keep clean; there is no water in either of the rooms, except what is carried from without, and it is to be feared that the men occasionally use the same water. The defective means of ablution, particularly with reference to the paucity of foot tubs, had been represented. Bathing parades took place twice and three times weekly in summer.

Rain water collected in tanks, the source of the supply, has been ample, except at Polverista, whither it had to be carried in barrels. Towards the end of the season the quality was not such as might have been desired, and an analysis by Staff Assistant-Surgeon Spurway detected the presence of a large amount of organic matter. The water at Isola Gate contained 3·416 grains per gallon; San Francisco, 2·716; and at Polverista, 1·660. It was recommended that filters should be issued, and charcoal thrown into the wells and tanks; a few filters were supplied for the use of the men at Isola and San Francisco. The sanitary arrangements have been, so far as the regiment is concerned, most carefully attended to, but as long as the present barracks are occupied by troops, defects which are not remediable must exist.

Diseases of the zymotic class have been very prevalent, and fevers in particular have caused a very large proportion of sickness and mortality. It is difficult to state the precise cause to which the prevalence of fever is ascribable, but it appears not improbable, taking into consideration the season during which the most severe and fatal cases occurred, that the state of the water, the ventilation, and the prevalence of hot enervating winds may have largely contributed towards their development. It would indeed be a difficult undertaking to delineate the precise types of these fevers, or to draw a well-marked line between cases of remittent and continued fevers, as but

Malta. few of the cases treated presented all those distinctive peculiarities noticed elsewhere or read of, and in the five cases entered under the head of typhoid, all the phenomena of enteric fever were not present. The sequelæ of fever at Malta are such as the Surgeon of the 8th Regiment had never before witnessed, and he enumerates numerous cases of orchitis, neuralgia, and rheumatism among them.

The cases of diarrhœa and dysentery in the Regiment were few and unimportant. There had been no overcrowding, but owing to the peculiar construction of the barracks, the ventilation is inadequate, and cannot be improved.

The 29th Regiment was stationed at Fort Ricasoli, a strong fortification built on the peninsula of rock which forms the eastern side of the entrance into the grand harbour of Valetta. It is about 50 feet above the sea level. The sanitary condition of the Fort during the year is reported by the Surgeon to have been pretty good; but he notices the defective construction of the barracks, particularly as regards windows and doors, and the ventilation of the casemates. The diseases prevailing during the year were of the zymotic class,—fevers of the continued type,* followed by rheumatism, orchitis, and cutaneous affections,—and were attributable to climatic conditions and defective sanitary arrangements. The Surgeon adds, however, that much was being done to improve the state of the barracks and quarters, in regard to drainage.

The 84th Regiment occupied Lower St. Elmo Barracks, the defective site and construction of which have been fully entered into in former reports, as well as by the Sanitary Commissioners in their Report.

The surgeon of the 1st Battalion 60th Rifles, which occupied the Floriana Barracks, speaks of the position of the barrack as too confined to be healthy. The rooms are casemated and dark, but, apart from their generally confined situation, fairly ventilated with numerous well made and efficient openings. Numerous ventilators have been made in the roofs of all the casemated rooms occupied by the men, and additional windows have been erected in them during the year, all tending to promote circulation of air; but the radical defect of site will always remain. Recommendations that certain small imperfectly-ventilated rooms occupied by married colour-sergeants should be evacuated by them, and occupied by single men, were duly complied with.

The cases of continued fever in the 60th have been very numerous, constituting more than one-fourth of the whole number of admissions into hospital. With few exceptions, however, they were of a very mild type, and appeared to be caused by exposure to the sun. Probably some of the cases were due to unwholesome exhalations. Next in number have been cases of diarrhœa. Many of these were apparently due to similar causes.

Dr. Chartres, surgeon of the 100th Regiment, in his Sanitary Report for 1866, remarks that the regiment removed from lower St. Elmo to Fort Verdala, on the 10th of March; and that on the 25th of same month a case of fever occurred, soon followed by many others of a similar type and nature.

This fever, which Dr. Chartres terms Verdala endemic fever, has been due chiefly to defective drainage, the system being very imperfect, requiring revision and the substitution of glazed earthenware pipes, of proper sectional area and capable of being easily and thoroughly flushed out by a reasonable amount of water, in the place of the present drains, cut out of the Maltese sandstone, which is so porous as to exhale noxious gases through the walls of drains constructed of it; also, in a great degree, to the imperfect state of the ventilation of the barrack-rooms, and more especially of those contained in the north-east wall of the fort, which possess no loop-holes, and but one foul-air shaft in each, opening on the roof, as all the others do in one direction only. In this state of things a very small number of occupants in each room would constitute overcrowding. The effects of climate and free indulgence in liquor may certainly have acted as accessories in the production of this disease.

On the outbreak of fever, Dr. Chartres submitted the following recommendations, the whole of which received the support of the Principal Medical

* For Report on the varieties of fever observed among the men, women and, children composing this corps, see p. 478, Appendix.

Officer, and were carried out, viz., that the circular-headed windows of barrack-rooms be removed *in toto*, that the shutters of foul-air shafts be never closed, that the men be equally distributed throughout the rooms; that as much water as possible be used for the latrines and drains; that the barrack-rooms be freshly limewashed; that the most perfect cleanliness be observed; that the men have refreshment of coffee every morning, the first thing after getting-up; that the forenoon parades be omitted whenever the sun's heat is very great; that a barrack-room be handed over for the use of the prisoners awaiting disposal; and that the bedding be regularly and carefully aired. The Principal Medical Officer also recommended to the authorities that 120 men be encamped, which was quickly done, leaving a distribution of about 6 men only to each barrack-room. By these measures, the disease received a check. On the 5th June tents were pitched for the entire regiment to sleep in by night, an arrangement attended by the happiest results eventually. *Malta.*

Several of the sanitary improvements recommended by the Commission still remain to be carried out, viz., ablution and bath accommodation, new cookhouses, the removal of the stables, the restoration of all misappropriations, &c.

Section II.

On the Extent of Invaliding among the Troops serving in the Mediterranean.

During the year 185 invalids were sent home from the Mediterranean, being in the ratio of 18·9 per 1,000 of the strength; and in the same time 182 were discharged the service at Netley as invalids, being 18·6 per 1,000. The disabilities of the invalids are stated in Abstract No. XI. of Appendix, from which the following classified summary has been framed :— *Mediterranean.*

	Invalids sent home from			Invalids discharged at Netley from		
	Gibraltar.	Malta.	Total.	Gibraltar.	Malta.	Total.
Continued Fevers	3	5	8	1	1	2
Dysentery and Diarrhœa	..	3	3	..	..	..
Ophthalmia	22	4	26	21	6	27
Rheumatism	4	8	12	5	6	11
Venereal Diseases	8	4	12	6	8	14
Dietic „	1	..	1	1	..	1
Diathetic „	..	1	1	..	..	..
Tubercular „	8	15	23	13	12	25
Diseases of the—						
Nervous System	6	12	18	9	20	29
Circulatory „	6	14	20	11	18	29
Respiratory „	16	4	20	8	3	11
Digestive „	6	5	11	3	7	10
Urinary „	1	..	1	1	..	1
Reproductive „	4	..	4	2	..	2
Locomotive „	7	2	9	5	3	8
Integumentary „	4	3	7	3	2	5
Diseases of Nutrition	..	4	4	2	3	5
Accidents and Violence	3	2	5	1	1	2
Total	99	86	185	92	90	182
Ratio per 1,000 of 1866	21·6	16·5	18·9	20·1	17·3	18·6
Mean Strength 1859-65	27·6	19·0	23·1	18·9	12·9	15·3

Mediterranean. The proportion sent home as invalids has been under the average of the preceding seven years, but the proportion finally discharged has been above it. Tubercular diseases and those of the nervous and circulatory systems have been the chief causes of invaliding at Malta, ophthalmia at Gibraltar; and tubercular diseases have been the cause of discharge from the service alike from each of these stations, although the number sent home on that account has been less from Gibraltar.

Section III.

Mean Daily Sick.

The average number constantly non-effective from sickness in 1866 was 153 at Gibraltar and 254 at Malta, being respectively in the ratio of 33·37 and 48·83 per 1,000 of strength. The following Table gives the usual information on this head :—

		Gibraltar.	Malta, exclusive of Royal Malta Fencibles.	United Kingdom. Infantry Regiments. Average of seven years, 1860–66.
Average Strength in 1866 ..		4,585	5,202	
Average constantly sick in 1866..		153	254	
Ratio per 1,000 constantly sick	1866 ..	33·37	48·83	43·58
	1859–65..	41·34	45·96	
		days	days	days
Average sick time to each Soldier	1866 ..	12·18	17·82	15·91
	1859–65..	15·09	16·78	
Average duration of the cases of disease	1866 ..	20·74	19·36	19·32
	1859–65..	18·37	19·00	

The mean daily sick and average sick time to each soldier in Gibraltar have been considerably below the average, though a little higher than in 1865. At Malta the proportion has been above the average, probably owing to the prevalence of fever.

In Gibraltar the average duration of the cases has been nearly 2½ days above the average, but in Malta it has only been one-third of a day above, though considerably longer than in 1865.

Section IV.

On the Influence of Age on the Mortality.

The following Table, framed from Abstract No. XII. of Appendix and from previous reports, shows the ratio of mortality by ages in quinquennial periods, during the year 1866, and the average of the seven preceding years :—

		Ratio of Deaths per 1,000 of Strength at each period of life.					
		Under 20..	20 and under 25.	25 and under 30	30 and under 35	35 and under 40.	40 and upwards.
Mediterranean Commands	1866	5·23	4·99	11·46	12·56	11·19	..
	1859-65	6·37	6·79	12·71	14·12	25·75	28·26

There has been an exemption in 1866 in favour of the age 20–24, but this is probably merely an irregularity resulting from the small number under observation. The high average ratios at the ages 35–9 and 40 and upwards were caused by the epidemic of cholera in 1865, when the men at advanced ages suffered much more than the younger classes.

III.—ON THE HEALTH OF THE TROOPS SERVING IN BRITISH AMERICA.

Section I.—Sickness and Mortality.

I.—CANADA.

STATISTICAL REPORT.

Canada. In June the 2nd Battalion 17th Regiment from Nova Scotia, in July the 2nd Battalion 23rd from Gibraltar, in September the 13th Hussars and 53rd Regiment from home, and in November the 100th Regiment from Malta arrived in the Command. The 47th Regiment left for Nova Scotia in the middle of July. In the early part of summer moveable columns were employed in the Districts of Niagara and Cornwall and in the line of the Richelieu, in anticipation of Fenian inroads from the territory of the United States. Although a brush took place at Fort Erie in the end of May between a body of Fenians and a party of Volunteers, the regular troops were not engaged. They are stated to have enjoyed excellent health during the period they were in the field.

The average strength of the troops during the year was 9,519. The admissions into hospital were 6,811, and the deaths amounted to 96, of which 64 occurred in and 25 out of hospital, and seven were of invalids on their passage to, or while at, Netley awaiting their discharge. These numbers give the proportion of 715 admissions and 10·10 deaths per 1,000 of the strength, both being in excess of the average of the seven preceding years.

The admissions into hospital and deaths were distributed in the different corps as follows:—

	Annual Average Strength.	Admitted into Hospital.	Deaths. In Hospital.	Deaths. Out of Hospital.	Deaths. Of Invalids.	Deaths. Total.	Annual ratio per 1,000. Admitted.	Annual ratio per 1,000. Died.
13th Hussars	111	157	..	..	..	..	1414·1	..
Royal Artillery	925	675	7	7	2	16	729·7	17·30
Royal Engineers	670	512	3	4	1	8	764·2	11·94
2nd Batt., 7th Regt.	183	140	3	..	..	2	765·0	10·93
1st „ 16th „	765	606	9	..	..	9	772·0	11·46
1st „ 17th „	696	544	5	2	..	7	781·6	10·06
2nd „ „ „	409	211	1	..	..	1	599·6	2·44
2nd „ 23rd „	368	287	3	2	..	5	790·6	13·77
1st „ 25th „	673	672	8	2	..	5	998·5	7·43
30th Regiment	711	377	2	1	1	4	530·2	5·62
47th „	362	194	1	1	..	2	535·9	5·52
53rd „	285	289	2	1	..	3	1212·7	12·77
4th Batt., 60th Regt.	702	500	3	1	1	5	712·2	7·12
100th Regiment	131	118	1	..	..	1	900·8	7·63
1st Batt., Rifle Brig.	710	418	5	1	3	9	588·7	12·68
4th „ „ „	768	413	5	1	..	6	537·8	7·81
Royal Canadian Rifles	997	639	8	3	2	13	636·9	13·04

Canada. The admissions were much above the average in the 13th Hussars and 53rd Regiment, but both these corps were in the command during only the last quarter of the year. Of those which were in Canada during the whole year the average was considerably exceeded only in the 1st Battalion, 25th Regiment. The ratio of mortality was highest in the Royal Artillery and lowest in the 30th Regiment, if the corps which were present during a portion of the year only be omitted.

The following Table shows the admissions and deaths by each class of diseases. The details for 1866 are given in Abstract No. XIII. of Appendix.

Orders.	Diseases.	Strength, 9,519. Admissions.	Deaths. In Canada.	Deaths. Of Invalids.	Deaths. Total.	Annual Ratio per 1,000. 1866. Admissions.	1866. Deaths.	1859-65. Admissions.	1859-65. Deaths.
	Class I.								
1	Miasmatic Diseases ..	1406	10	..	10	147·7	1·05	126·9	1·13
2	Enthetic „	1319	1	..	1	138·6	·11	165·4	·04
3	Dietic „	167	2	..	2	17·9	·21	20·1	·21
4	Parasitic „	119	..	..	..	12·4	..	6·6	..
	Class II.								
1	Diathetic Diseases	39	1	..	1	4·1	·11	2·5	·02
2	Tubercular „	69	10	4	14	7·2	1·47	8·6	1·71
	Class III. Diseases of the								
1	Nervous System	159	6	..	6	16·7	·63	15·3	1·11
2	Circulatory „	60	11	2	13	6·3	1·36	6·9	1·15
3	Respiratory „	801	26	..	26	84·1	2·73	64·9	1·17
4	Digestive „	357	2	..	2	37·5	·21	30·9	·44
5	Urinary „	18	..	..	..	1·9	..	2·1	·20
6	Reproductive „	79	..	..	..	8·3	..	7·0	..
7	Locomotive „	32	..	..	..	3·3	..	3·2	·04
8	Integumentary „	1038	1	..	1	109·0	·11	95·1	·04
	Class IV.								
4	Diseases of Nutrition ..	22	..	..	..	2·3	..	·8	..
	Class V.								
1	Accidents	1077	14	..	14	113·1	1·47	100·2	2·13
3	Homicide	..	1	..	1	..	·11	..	·08
4	Suicide	1	3	1	4	·1	·42	·2	·25
5	Execution	..	1	..	1	..	·11	..	·02
6	Corporal Punishment ..	33	..	..	..	3·4	..	1·5	..
	No appreciable disease ..	15	..	..	..	1·6	..	·2	..
	Diseases not specified ..	..	..	..	..	..	..	·5	..
	Total ..	6811	80	7	96	715·5	10·10	661·9	9·74

The excess in the admissions has been chiefly in miasmatic diseases and those of the respiratory and integumentary systems; in the deaths it has been in diseases of the respiratory system.

Miasmatic Diseases.—The admissions and deaths by the principal diseases constituting this group have been as follows:—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength. 1866. Admitted.	1866. Died.	1859-65. Admitted.	1859-65. Died.
Eruptive Fevers	14	..	1·5	..	4·7	·13
Paroxysmal „	52	..	5·5	..	5·5	·10
Continued „	155	7	16·3	·74	17·4	·59
Dysentery, Diarrhœa, and Cholera ..	359	2	37·7	·21	22·5	·08
Sorethroat and Influenza	252	..	26·5	..	28·2	..
Ophthalmia	180	..	18·9	..	14·0	..
Rheumatism	311	1	32·7	·11	25·5	·04

Eruptive Fevers were much below the average of the seven preceding years.

Dysentery, Diarrhœa, and Cholera were much above the average. Spasmodic cholera prevailed to a considerable extent in the United States during the greater part of the year, having appeared first at New York in the beginning of May. The disease, however, did not spread to the British possessions, with the exception of the small town of Stratford, C.W., where it broke out in the end of October, and in the course of 10 days 13 cases and 9 deaths occurred, all among the civil population; the disease then ceased. Although the admissions by diarrhœa were considerably above the average of previous years, the excess was chiefly in one regiment, the 53rd, stationed at London, C.W., and was believed to have arisen from the use of impure and unwholesome drinking water obtained from one of the wells. The principal medical officer states that, "when the well was cleaned out and newly lined, and rendered impervious to leakage, the water regained its healthy properties." In two months this corps had 96 cases of diarrhœa, while the total number in the rest of the Force during the whole year was only 234. Six cases of cholera and one death were reported, but they do not appear to have been of the spasmodic form.

Enthetic Diseases.—The returns show a reduction in the prevalence of venereal diseases to the extent of 21 per 1,000 compared with 1860, and 27 per 1,000 with the average of the seven years 1859–65.

Diseases of the Respiratory System were considerably above the average both in prevalence and mortality. The excess was in bronchitis and inflammation of the lungs. The 1st Battalion 25th, the 53rd, the 1st Battalion Rifle Brigade, and the Royal Canadian Rifles furnished the highest proportion of cases.

The other classes do not seem to require special remark.

Sanitary Report.

Inspector-General Dr. Muir says, so general was the demand for extra blankets, on the recommendation of medical officers last winter, that he suggests the expediency of an additional one being in future allowed, by general order, to all the troops in the Command, except to those occupying wooden huts, where a third is already sanctioned.

Dr. Muir adds: I have the authority of the Quartermaster-General for stating that every soldier in the Command has his 600 feet regulated allowance of cubic space, huts 500, except the men of the 30th Regiment, quartered in the Jesuits' Barracks, Quebec, where this average is not reached, but where steps are being taken to supply the deficiency.

Efforts have been made by the Deputy Quartermaster-General during the year to maintain the regulated standard of 600 feet, although unusually large

Canada. drafts last summer and the sudden increase of the garrison have made this a difficult matter, where the accommodation at command is so limited.

The new regiments have been admirably housed at London, Brentford, Toronto, and Ottawa, and the accommodation provided for their sick has been liberal and excellent. In the fitting of these buildings every sanitary suggestion made by myself or my subordinate officers has been cheerfully acquiesced in and carried out. The general permanent hospital accommodation of the command has been increased by the erection of an excellent hut at London (with purveyor's offices adjoining), where it was much wanted.

But the greatest improvement of the year has been the substitution of an excellent general hospital in Montreal in lieu of the four line regimental hospitals formerly in use. Not only has a large saving to the public been effected thereby, but the sick are more comfortably accommodated. This hospital is heated by furnaces (by which it is calculated 300*l.* a-year is saved), and fitted up with every requirement. The garrison hospital at Quebec, partially destroyed by fire in January last, has been rebuilt, and much improved by the addition of water-closets, ablution and bath-rooms, steam heating apparatus, and the removal of partitions between wards and corridors.

While the troops are everywhere well housed, there is great difficulty in keeping the air in their rooms in a due state of purity during the winter season. This is a defect that can only be remedied by building barracks proper, instead of hiring stores and other buildings for the accommodation of troops, which it is to be hoped will be one of the first fruits of confederation. The ill effects of impure air are not very perceptible in private houses, where the inmates are few; but when 30 or 40 men are put up in a single room, where they take their meals as well as sleep for six or seven months consecutively, there can scarcely be a question that the seeds of grave disease, especially consumption, are laid, although the necessary connection between cause and effect may not be at once traced. I cannot help thinking that the large number of men treated and invalided for chest disease during the five years I have been in this command bear a close relationship to this impure state of barrack air.

While on the subject of accommodation, I have much pleasure in stating that great improvements have been made in this respect, and that at some stations, such as London and Quebec, the married people are better put up than I have ever found them elsewhere. In some localities, such as Montreal, they are still overcrowded and indifferently provided for; but, even under these disadvantageous circumstances, they are better housed than if obliged to have recourse to the back slums of the city, exposed to disease of every kind, because their small allowance of 4*d.* per diem is too small to command a room in a decent neighbourhood, with fuel in addition,—in this climate a most expensive article.

It is to be regretted that the men's rooms are still unprovided with coal-oil lamps by the Barrack Department, such being generally supplied, when used, from the Canteen fund.

The Canteen system, which is in general operation throughout the Command, continues to be a great success, and has aided in the erection of skating rinks (covered in and well lit with gas or coal-oil lamps), which are now to be found in almost every barrack-square, and have become quite an institution in this country.

The means and variety of cooking are all that can be desired; and those for ablution and bathing have been considerably augmented during the year, and are (with one or two exceptions about to be supplied) in an equally satisfactory state.

The only addition to the clothing that I would suggest would be a loose serge tunic for men and officers for summer wear, and that mocassins should be more generally used than they are in the winter, the long boots being cold and uncomfortable.

The establishment of sanitary committees at every station, as already ordered by his Excellency the Lieutenant General Commanding, has done much good in the way of improved drainage, sewerage, cleaning away nuisances, &c.

The threatened Fenian incursion which set all our forces in motion early in the summer had the best possible effect on their health, which was never so

good before, and it were very desirable that moveable columns were more in vogue. The same remark applies to employing the men on public works, such as the fortifications at Quebec, which also had a beneficial influence on their health. *Canada.*

The establishment of gardens at all available stations, for the amusement of the men, may be said to have been inaugurated at my suggestion this year, and was successful in Toronto and some other places; but the dispersion of the troops, owing to Fenian troubles, prevented the plan being so fully carried out as it would otherwise have been.

When men are encamped for rifle practice, or any other duty, they should invariably have a tent supplied to serve as an ablution-room; at Chambly, especially, this want was much felt.

II. Nova Scotia and New Brunswick.

STATISTICAL REPORT.

In April the 1st Battalion 22nd and 2nd Battalion 4th Regiments arrived from Malta, and in July the 47th Regiment from Canada. In May the 2nd Battalion 16th embarked for Barbadoes, and in June the 2nd Battalion 17th left for Canada. *Nova Scotia and New Brunswick.*

The average strength of the troops during the year was 3,247; the admissions into hospital were 1,603, and the deaths 25, being in the ratio of 494 and 7·70 per 1,000 of mean strength. Of the deaths 18 occurred in and 6 out of hospital, and one among the invalids at Netley. The admissions int hospital and deaths in each corps were as follows:—

Corps.	Average Annual Strength.	Admitted into Hospital.	Died.				Ratio per 1,000 of Strength.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Royal Artillery	444	217	5	1	..	6	488·7	13·51
Royal Engineers. ..	199	118	..	1	..	1	593·0	5·02
2nd Batt. 4th Regiment.	511	217	1	1	1	3	424·7	5·87
1st „ 15th „	678	411	6	..	..	6	606·2	8·85
2nd „ 16th „	250	131	..	..	..	..	524·0	..
2nd „ 17th „	331	140	1	1	..	2	423·0	6·04
1st „ 22nd „	505	201	2	3	..	5	398·0	9·90
47th Regiment	310	169	2	..	..	2	545·2	6·45

The admissions and deaths by each class of diseases are shown in the following Table. The details for 1866 are given in Abstract No. XIII. of Appendix.

Nova Scotia and New Brunswick.

Orders.	Diseases.	1866. Mean Strength, 3,247. Admissions.	Deaths. In Nova Scotia.	Deaths. Of Invalids.	Deaths. Total.	Annual Ratio per 1,000 of Strength. Admitted.	Died.	1859–65. Annual Ratio per 1,000 of Strength. Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	419	5	..	5	129·0	1·54	128·5	·74
2	Enthetic ,, ..	293	..	..	..	90·2	..	129·2	..
3	Dietic ,, ..	58	..	..	..	17·9	..	14·2	·51
4	Parasitic ,, ..	12	..	..	..	3·7	..	12·0	..
	Class II.								
1	Diathetic Diseases ..	6	..	..	..	1·9	..	1·3	·11
2	Tubercular ,, ..	35	2	1	3	10·8	·92	9·8	1·71
	Class III. Diseases of the—								
1	Nervous System ..	54	5	..	5	16·6	1·54	12·8	·68
2	Circulatory ,, ..	8	2	..	2	2·5	·62	3·4	·97
3	Respiratory ,, ..	129	4	..	4	39·7	1·23	50·6	·91
4	Digestive ,, ..	54	1	..	1	16·6	·31	28·8	·45
5	Urinary ,, ..	3	..	..	..	·9	..	1·8	..
6	Reproductive ,, ..	16	..	..	..	4·9	..	4·4	..
7	Locomotive ,, ..	5	..	..	..	1·5	..	2·2	..
8	Integumentary ,, ..	234	..	..	..	72·1	..	83·4	..
	Class IV.								
4	Diseases of Nutrition ..	2	..	..	..	·6	..	·8	..
	Class V.								
1	Accidents	257	3	..	3	79·1	·92	87·1	1·20
3	Homicide	..	..	..	..	..	..	..	·11
4	Suicide	..	2	..	2	..	·62	..	·06
6	Corporal Punishment ..	18	..	..	..	5·6	..	2·1	..
	Diseases not stated ..	..	..	..	..	..	..	1·2	..
	Total	1,603	24	1	25	493·6	7·70	573·6	7·40

The admissions have been under the average, chiefly from a decrease in venereal diseases and those of the respiratory, digestive and integumentary systems.

MIASMATIC DISEASES, when sub-divided into groups, give the following results :—

Nova Scotia and New Brunswick.

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 of Mean Strength. 1866. Admitted.	1866. Died.	1859-65. Admitted.	1859-65. Died.
Eruptive Fevers	2	..	·6	..	1·0	..
Paroxysmal „	7	..	2·2	..	1·1	..
Continued „	42	5	12·9	1·54	12·6	·45
Dysentery, Diarrhœa, and Cholera	48	..	14·8	..	13·2	·06
Sorethroat and Influenza	102	..	31·4	..	42·8	..
Ophthalmia	115	..	35·4	..	20·4	..
Rheumatism	75	..	23·1	..	27·2	..

Continued Fevers.—Although the admissions by fevers of this type have not exceeded the average of the seven preceding years, their prevalence would have been considerably less but for the occurrence of 13 cases of typhoid fever, of which three terminated fatally in the 1st Battalion 15th Regiment. The greater number of the cases occurred in June. The disease is stated to have been prevailing at the time in St. John's, N.B., where the regiment was quartered. The medical officer in charge states that it was not traceable to any local cause in the barracks, and adds that it usually prevails in St. John's at the commencement of the spring.

Ophthalmia is the only disease which shows an appreciable excess over the average, and that has been due to its prevalence in the 1st Battalion 22nd Regiment, which arrived in the Command in April from Malta, where it had in previous years suffered considerably from this disease. The cases occurred in men who had previously been affected, and its prevalence cannot, therefore, be attributed to the climate of New Brunswick.

Enthetic Diseases.—The returns show a continuance in the reduction of the amount of venereal diseases in this Command.

The ratio of admissions on account of corporal punishment was very high; of the 18 cases under this head 10 occurred in the 1st Battalion 22nd Regiment.

III.—Newfoundland.

Statistical Report.

Newfoundland.

The average strength of the garrison, which consisted as before of a Battery of Royal Artillery and two Companies of the Royal Canadian Rifles, was 287; the admissions into hospital were 112, and the deaths 4, being in the ratio of 390 and 13·92 per 1,000 of mean strength: both under the proportion in the preceding year.

The admissions and deaths by each class of diseases are stated in the following table. The numbers for 1866 will be found in Abstract No. XIII. of Appendix.

Newfoundland.

Orders.	Diseases.	Strength, 287.				Annual Ratio per 1,000. 1866.		1859-65.	
		Admissions.	In Newfoundland.	Of Invalids.	Total.	Admissions.	Deaths.	Admissions.	Deaths.
	Class I.								
1	Miasmatic Diseases	18	..	..	..	62·7	..	225·8	..
2	Enthetic „	15	..	..	..	52·2	..	38·6	..
3	Dietic „	5	..	..	..	17·4	..	33·0	·55
4	Parasitic „	..	..	..	..	..	..	4·4	..
	Class II.								
1	Diathetic Diseases	..	..	..	..	..	..	3·9	..
2	Tubercular „	5	1	..	1	17·4	3·48	11·0	1·65
	Class III. Diseases of the—								
1	Nervous System	8	..	..	..	27·9	..	36·9	1·65
2	Circulatory „	..	1	..	1	..	3·48	13·8	1·10
3	Respiratory „	23	..	..	..	80·1	..	78·2	2·75
4	Digestive „	6	..	..	..	20·9	..	37·4	..
5	Urinary „	1	1	..	1	3·5	3·48	2·2	..
6	Reproductive „	2	..	..	..	7·0	..	3·9	..
7	Locomotive „	..	..	..	..	..	..	6·6	..
8	Integumentary „	8	..	..	..	27·9	..	51·2	..
	Class IV.								
4	Diseases of Nutrition	..	..	..	..	..	..	..	..
	Class V.								
1	Accidents	21	1	..	1	73·2	3·48	110·1	·55
6	Corporal Punishment ..	..	..	..	..	..	..	2·7	..
	Diseases not stated	..	..	..	..	..	..	2·7	..
	Total	112	4	..	4	390·2	13·92	662·4	8·25

Compared with the returns for 1865 the admissions under the head of intemperance (*ebriositas*), were only half as numerous in the year under review. Scarlet fever prevailed as an epidemic among the children, but none of the men were attacked. The admissions by diseases of the respiratory organs were much higher than in 1865, but did not exceed the average of previous years.

SANITARY REPORT.

Nova Scotia, New Brunswick, and Newfoundland.

Deputy-Inspector General Dr. Barrow states that reports have been frequently made as to the very defective sanitary state of St. John's, New Brunswick, which is almost destitute of sewers. Every spring typhoid fever breaks out in the town, and spreads to the military, causing a certain loss of life.

St. John's, Newfoundland, is in the same insanitary condition. At the end of 1866 a severe epidemic of malignant scarlatina was prevailing in the town, and extended to the children of the Royal Canadian Rifles, living on Signal Hill, several of whom died.

The health of the troops would be promoted by the application of the new system of ventilation to all buildings in the command where practicable, especially when not built of wood. This is the more necessary, as the cubic space is generally under the regulations.

The hospital accommodation requires extension; no provision is made for a sickly season. *Nova Scotia, New Brunswick, and Newfoundland.*

The guard-room space is far too confined for health, especially in Halifax and St. John's, New Brunswick.

Proper bath accommodation is required at the Glacis and the Wellington Barracks, Halifax, and at the Garrison Hospital, St. John's, Newfoundland.

The accommodation for the families of married soldiers is insufficient everywhere. This is about to be remedied at Halifax to some extent.

The sanitary improvements which have been effected during the year have been numerous, but of a minor character.

IV. BERMUDA.

STATISTICAL REPORT.

Bermuda.

In the end of October the 81st Regiment arrived from England and relieved the 2nd Battalion 2nd Regiment, which returned home. In addition to these corps the garrison consisted of two batteries of Royal Artillery and three Companies Royal Engineers. The average strength of the troops was 1,249; the admissions into hospital amounted to 1,055 and the deaths to 30, of which 26 occurred in and 2 out of hospital, and two among invalids on their passage home and at Netley. These numbers give the ratio of 845 admissions and 24·01 deaths per 1,000 mean strength, being considerably higher than in 1865.

The following table shows the influence of the different classes of diseases on the admissions and deaths. The details for 1866 will be found in Abstract No. XIII. of Appendix.

Bermuda.

Orders	Diseases.	1866. Mean Strength, 1,249. Admissions.	Deaths. In Bermuda.	Deaths. Of Invalids.	Deaths. Total.	1866. Annual Ratio per 1,000 of Strength. Admissions.	Deaths.	1859-65. Annual Ratio per 1,000 of Strength. Admissions.	Deaths.
	Class I.								
1	Miasmatic Diseases	327	14	..	14	261·8	11·21	248·8	23·40
2	Enthetic „	122	..	..	..	97·7	..	61·6	..
3	Dietic „	50	..	..	..	40·0	..	34·3	·26
4	Parasitic „	4	..	..	..	3·2	..	5·2	..
	Class II.								
1	Diathetic Diseases	12	..	..	..	9·6	..	3·6	·13
2	Tubercular „	36	3	2	5	28·8	4·00	10·5	2·60
	Class III. Diseases of the—								
1	Nervous System	54	7	..	7	43·2	5·60	27·7	2·73
2	Circulatory „	11	1	..	1	8·8	·80	5·1	1·17
3	Respiratory „	39	..	..	..	31·2	..	43·6	·65
4	Digestive „	57	1	..	1	45·7	·80	51·5	·91
5	Urinary „	2	..	..	..	1·6	..	1·3	..
6	Reproductive „	21	..	..	..	16·8	..	8·9	..
7	Locomotive „	8	..	..	..	6·4	..	3·0	..
8	Integumentary „	163	..	..	..	130·5	..	95·0	..
	Class IV.								
4	Diseases of Nutrition ..	6	..	..	..	4·8	..	3·6	..
	Class V.								
1	Accidents	134	2	..	2	107·3	1·60	90·6	1·69
4	Suicide	..	..	..	..	..	..	..	·78
6	Corporal Punishment ..	9	..	..	..	7·2	..	2·3	..
	Diseases not specified ..	..	..	..	..	..	..	1·4	..
	No appreciable disease ..	..	..	..	..	..	..	·4	..
	Total..	1055	28	2	30	844·6	24·01	698·4	34·32

The admissions have been considerably above the average of the preceding seven years, but the deaths have been much under it. If, however, the year 1864, in which the yellow fever prevailed as an epidemic, be deducted, the mortality in 1866 has been double the average of the remaining six years, the excess being due chiefly to miasmatic diseases.

Miasmatic Diseases, when sub-divided into groups, give the following results :—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Strength. 1866. Admitted.	1866. Died.	1859-65. Admitted.	1859-65. Died.
Paroxysmal Fevers	3	..	2·4	..	3·0	·13
Continued „	130	12	104·1	9·61	64·0	·39
Yellow Fever	..	..	..	..	64·3	22·75
Dysentery, Diarrhœa, and Cholera	131	2	104·9	1·60	45·0	·13
Sorethroat and Influenza..	14	..	11·2	..	14·7	..
Ophthalmia	11	..	8·8	..	28·2	..
Rheumatism	29	..	23·2	..	24·3	..

Continued Fevers were much above the average and were the chief cause of the mortality in the Island. Typhoid fever was very prevalent among the civil population throughout the year. Among the troops it prevailed to a considerable extent in the Royal Engineers, in July, August, and September 33 cases and 4 deaths having occurred in a strength of about 275 men, and in the 2nd Battalion 2nd Regiment, from January to October, 78 cases were admitted and 7 died in an average strength of 730. In the 2nd Regiment 71 cases and 4 deaths were returned under the head of continued, and 7 cases and 3 deaths under typhoid fever. The Royal Artillery, which was quartered in the Island during the whole year, and the 61st Regiment, which arrived from England in the end of October, both escaped the disease. The exemption of the Royal Artillery was attributed, by the medical officer in charge, "to the fact of their being quartered in a more exposed and open site" than the other two corps. In addition to climatic causes, the medical officer in charge of the Royal Engineers attributed the prevalence of typhoid fever among them to the existence of latrines in the form of cesspits, but there appears to have been a general tendency to this form of disease among the population of St. George's.

Dysentery and Diarrhœa were much more prevalent than usual, but no special cause could be ascertained. The 2nd Regiment furnished the largest proportion of cases.

Ophthalmia was much below the previous average and was the source of a very trifling amount of inefficiency.

Enthetic Diseases continue to show an increase in their prevalence. As in 1865 this has taken place in the cases of syphilis.

Tubercular Diseases.—Both admissions and deaths by this class have greatly exceeded the average, but it is probably an accidental variation depending on the smallness of the numbers under observation.

Diseases of the Nervous System were also much in excess of the average; the cause of this is unfortunately too manifest from the circumstance that 22 of the admissions and 5 of the deaths resulted from *delirium tremens*. In addition to this amount of disease, the direct result of intemperance, there were 49 admissions from that cause included among the dietic diseases.

Diseases of the Integumentary System.—The increase in the prevalence of this class has been chiefly in boils (*phlegmon*) and ulcers.

SANITARY REPORT.

Deputy Inspector-General Dr. Grant reports that the principal conditions inimical to health which have been stated by regimental medical officers, and observed by himself, are:—the existence of open privies and cesspits, insufficient cleansing of ashpits, and absence of a system of drains properly flushed

Bermuda. at every station in the Command; the want of sufficient barrack and hospital accommodation, and the consequent exposure of a large proportion of the troops and the sick in tents at all seasons of the year; and, he adds, the want of occasional fires in the barrack-rooms. The climate is damp and variable, and often cold to those who have been long in it. Improved means of cooking are required at St. George's and Ireland Island.

With reference to drainage, he recommends a system of drains properly flushed, the abolition of cesspits, and a daily cleansing of ashpits, for which purpose an additional horse and cart might be allowed to the Commissariat establishment at each station, if a contract cannot be made on advantageous terms; and such an increase to the barrack accommodation as will allow 750 cubic feet of space per man in barracks and huts, and 1,000 cubic feet in all casemate buildings. Suitable officers' quarters are also required.

Surgeon-Major Dr. Grant adds that the military stations at Bermuda have never had the advantage of the improvements recommended by the Sanitary Commission of 1858; their sanitary condition cannot be materially improved without extensive works, for which a large grant is required. Commissions have been appointed after each epidemic visitation; they have all made much the same reports, and recommended much the same improvements.

Section II.

On the Extent of Invaliding.

British America. During the year 204 invalids were sent to England from Canada and Nova Scotia, and 38 from Bermuda, being respectively in the proportion 15·6 and 30·4 per 1,000 of mean strength. Thirty invalids were finally discharged the service in America, and 134 of those sent from America, and 24 of those from Bermuda were discharged at Netley, being a loss to the force of 12·6 in the former and 19·2 in the latter Command per 1,000 of mean strength.

The following Table shows the influence of the different classes of diseases in causing disability. The details are stated in Abstract No. XIV. of Appendix

	Invalids sent home		Invalids Discharged the Service		
	From British America.	From Bermuda	In British America.	In England, sent from	
				British America.	Bermuda
Continued Fever	1	..	..	..	..
Diarrhœa	1	..	..	..	..
Chronic Dysentry	..	..	..	1	..
Sorethroat	..	..	..	1	..
Ophthalmia	7	1	..	6	..
Rheumatism	9	1	1	4	..
Enthetic Diseases	10	2	1	6	1
Diathetic „	2	1	1	1	..
Tubercular „	39	13	6	30	8
Diseases of the—					
Nervous System	33	7	4	15	5
Circulatory „	21	4	5	18	3
Respiratory „	31	..	2	17	..
Digestive „	9	1	2	7	3
Urinary „	4	1	1	2	1
Reproductive „	1	2	1	1	..
Locomotive „	10	2	..	9	1
Integumentary „	9	..	1	5	1
Diseases of Nutrition	7	2	5	3	..
Accidents and Violence	10	1	..	8	1
Total	204	38	30	134	24
Ratio per 1,000 of Mean Strength { 1866	15·6	30·4	2·3	10·3	19·2
Ratio per 1,000 of Mean Strength { 1859–65	15·9	18·0	2·2	14·7	11·2

The proportion of invalids sent home from British America has not exceeded, and the number finally discharged the service has been considerably under the average. Tubercular diseases have been the most prominent cause of disability; diseases of the nervous, respiratory, and circulatory systems ranking next. The proportion sent home from Bermuda and discharged at Netley has been considerably above the average; tubercular diseases and those of the nervous system being the chief causes. The increase of the former may probably have been in some degree a consequence of the epidemic of fever.

Section III.

Mean Daily Sick.

The average number constantly non-effective from sickness was in Canada 374, in Nova Scotia and New Brunswick 75, in Newfoundland 6·3, and in Bermuda 84. From these numbers the following results are obtained:—

Canada.

	Canada.		Nova Scotia and New Brunswick.		Newfoundland.		Bermuda.	
	1866.	1859-65.	1866.	1859-65.	1866.	1859-65.	1866.	1859-65.
Ratio per 1,000 of strength constantly sick ..	39·29	29·69	23·10	26·04	21·95	31·39	67·25	36·66
Average sick time to each soldier	days 14·34	days 10·84	days 8·43	days 9·50	days 8·01	days 11·45	days 24·55	days 13·38
Average duration of the cases of disease	20·04	16·37	17·08	16·57	20·58	17·29	29·06	19·16

Compared with the average of the seven years 1859-65 there has been an increase in Bermuda and Canada in all these particulars, and a decrease in Nova Scotia and Newfoundland except as regards the duration of disease.

Section IV.

Influence of Age on the Mortality.

The following Table, framed from Abstract No. XV. of Appendix, shows the ratio of mortality per 1,000 of the troops at different periods of life in British America and the Bermudas :—

Stations.	Ratio of Deaths per 1,000 of Strength at each age.					
	Under 20.	20–24.	25–29.	30–34.	35–39.	40 and upwards.
Canada, Nova Scotia, New Brunswick, and Newfoundland ..	6·77	5·72	11·33	18·05	20·81	22·42
Bermuda	..	..	23·53	55·55	34·48	..
Total 1866 ..	6·66	5·32	11·88	15·03	21·25	22·03
Total 1859–65 ..	2·88	7·15	11·96	11·50	18·36	15·15

IV.—ON THE HEALTH OF THE TROOPS SERVING IN THE WEST INDIES.

Section I.
Sickness and Mortality.

I. Windward and Leeward Command.

STATISTICAL REPORT.

1. White Troops.

Windward and Leeward Command.

In the middle of March a detachment of the Royal Artillery and two Companies 2nd Battalion 3rd Foot returned to Barbadoes from Jamaica, where they had been serving since the preceding October. In May a Battery of the 1st Brigade R.A. arrived from Gibraltar and relieved one of the 15th Brigade which, in the end of June, embarked for Gibraltar, and the 2nd Battalion 16th Regiment from Nova Scotia relieved the 2nd Battalion 3rd Regiment, which returned to England. In the middle of August the Detachment of the 2nd Battalion 6th Regiment at Trinadad was relieved by a Company of the 16th from Demerara and one from Barbadoes, and rejoined the Head Quarters in Jamaica.

The average strength of the White Troops in the Command throughout the year was 888; the admissions into hospital were 1,438 and the deaths 26, all in hospital. The admissions, therefore, were in the ratio of 1,619 and the deaths of 29·29 per 1,000 of mean strength: both greatly in excess of the average.

The following Table, framed from Abstract No. XVI. of Appendix, shows the influence of the different classes of diseases in producing sickness and mortality :—

Windward and Leeward Command.

Orders.	Diseases.	1866. Strength, 888. Admitted.	Died. In the Command.	Died. Of Invalids.	Died. Total.	1866. Ratio per 1,000. Admitted.	1866. Ratio per 1,000. Died.	1859–65. Ratio per 1,000. Admitted.	1859–65. Ratio per 1,000. Died.
	Class I.								
1	Miasmatic Diseases. ..	700	22	..	22	788·3	24·77	530·0	4·71
2	Enthetic „	231	..	..	..	260·1	..	152·8	..
3	Dietic „	40	1	..	1	45·0	1·13	30·7	·49
4	Parasitic „	12	..	..	..	13·5	..	5·1	..
	Class II.								
1	Diathetic Diseases ..	7	..	..	..	7·9	..	5·9	..
2	Tubercular „	10	..	..	..	11·3	..	10·0	1·57
	Class III. Diseases of the—								
1	Nervous System ..	24	1	..	1	27·0	1·13	33·3	2·05
2	Circulatory „	6	..	..	..	6·8	..	6·2	·97
3	Respiratory „	26	..	..	..	29·3	..	34·3	·36
4	Digestive „	52	1	..	1	58·6	1·13	66·8	·84
5	Urinary „	4	..	..	..	4·5	..	·8	..
6	Reproductive „	10	..	..	..	11·3	..	18·1	..
7	Locomotive „	..	..	..	..	..	..	3·7	..
8	Integumentary „	208	..	..	..	234·1	..	158·8	..
	Class IV.								
4	Diseases of Nutrition ..	7	..	..	..	7·9	..	2·3	..
	Class V.								
1	Accidents	95	1	..	1	107·0	1·13	97·9	·60
4	Suicide	..	..	..	..	..	..	·5	·60
6	Corporal Punishment ..	6	..	..	..	6·8	..	1·7	..
	Diseases not stated ..	..	..	..	..	..	..	2·6	..
	Total ..	1,438	26	..	26	1619·4	29·29	1161·5	12·19

The excess in the admissions has taken place chiefly in miasmatic and venereal diseases and in those of the integumentary system.

Miasmatic Diseases, when sub-divided into groups, give the following results :—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength. 1866. Admitted.	1866. Died.	1859-65. Admitted.	1859-65. Died.
Eruptive Fevers	..	..	..	..	1·4	..
Paroxysmal „	304	4	342·3	4·52	292·2	3·74
Continued „	85	1	95·7	1·13	51·3	·60
Yellow Fever	29	16	32·6	18·01	..	..
Dysentery, Diarrhœa, & Cholera	202	1	227·4	1·13	46·2	·12
Sorethroat and Influenza ..	16	..	18·0	..	11·1	..
Ophthalmia	22	..	24·8	..	91·9	..
Rheumatism	21	..	23·7	..	24·9	·12

Paroxysmal Fevers, although considerably above the average of the seven preceding years, were very little in excess of the proportion in 1865 ; as in that year, the high ratio was due to the great prevalence of intermittent and remittent fevers in Demerara.

Continued Fevers were nearly twice as prevalent as usual. The excess occurred chiefly at Barbadoes. The disease was of a mild type. No special cause for the increase in its prevalence has been stated by the medical officer. *Windward and Leeward Command.*

Yellow Fever prevailed as an epidemic among the white troops in Demerara from the middle of September till the beginning of November, when, in consequence of its prevalence and the high resulting mortality, the detachment was removed to Barbadoes, being replaced by black troops.

Dysentery and Diarrhœa were greatly in excess of the average in consequence of the prevalence of diarrhœa as an epidemic amongst the men of the 16th Regiment, at Barbadoes, during the month of September. The disease was attributed by the Surgeon of the Regiment to "climatic influences acting on men recently arrived from North America." It was confined, however, to the portion of the Regiment quartered at Barbadoes, and did not affect to any extent, the detachments at Trinidad and Demerara. Of 187 admissions by diarrhœa throughout the Command, during the year, 147 occurred at Barbadoes in the 16th Regiment between May and December, and 57 of these in the month of September.

Ophthalmia continues to show a progressive decrease in the admissions, which were little more than half as numerous as in 1865.

ENTHETIC DISEASES were slightly below the proportion which occurred in 1865, but still greatly above the previous average. The excess, as in that year, occurred at Barbadoes, and was marked by the predominance of syphilitic compared with gonorrhœal affections.

The relative prevalence of the different classes of diseases among the white troops at the various stations in this Command is shown in the following Table, framed from Abstract No. XVI. of Appendix :—

Windward and Leeward Command.

Orders.	Diseases.	Ratio per 1,000 of Mean Strength in 1866. Barbadoes. Admitted.	Barbadoes. Died.	Trinidad. Admitted.	Trinidad. Died.	British Guiana. Admitted.	British Guiana. Died.
	Class I.						
1	Miasmatic Diseases ..	509·2	..	659·7	5·23	3023·0	241·38
2	Enthetic ,, ..	329·5	..	120·4	..	80·4	..
3	Dietic ,, ..	8·2	..	10·4	..	379·3	11·50
4	Parasitic ,, ..	9·9	..	31·4	..	..	..
	Class II.						
1	Diathetic Diseases ..	3·3	..	26·2	..	..	..
2	Tubercular ,, ..	11·5	..	10·4	..	11·5	..
	Class III. Diseases of the—						
1	Nervous System ..	34·4	1·64	15·7	..	..	..
2	Circulatory ,, ..	8·2	..	5·2	..	..	..
3	Respiratory ,, ..	18·0	..	62·8	..	34·4	..
4	Digestive ,, ..	42·6	1·64	115·2	..	46·0	..
5	Urinary ,, ..	..	..	10·4	..	23·0	..
6	Reproductive ,, ..	13·1	..	5·2	..	11·5	..
7	Locomotive ,, ..	..	..	..	..	..	..
8	Integumentary ,, ..	178·7	..	403·1	..	252·9	..
	Class IV.						
4	Diseases of Nutrition.	4·9	..	15·7	..	11·5	..
	Class V.						
1	Accidents	91·8	..	178·0	5·23	57·5	..
6	Corporal Punishment	8·2	..	5·2	..	..	..
	Total ..	1272·2	3·28	1675·0	10·46	3931·0	252·88
	Ratio per 1,000 in 1859–65 ..	1103·5	6·98	1117·8	19·5	1646·7	25·38

At Barbadoes the admissions were above the average, chiefly from the prevalence of diarrhœa in the 16th Regiment, as already noticed, and from venereal diseases.

At Trinidad, also, the admissions were comparatively high, chiefly from fevers and skin diseases. The medical officer in charge states that the cases of intermittent fever, 44 in number, were almost exclusively confined to the company which came from Demerara, where most of the men had suffered from attacks of it. Thirty-five admissions appeared under the head of *Herpes*, but no information is given as to the origin of the disease.

At Demerara the admissions were enormously high and the deaths amounted to ten times the average of the seven preceding years. The great increase in the admissions was chiefly, and in the deaths entirely, due to miasmatic diseases, but the admissions by dietic diseases and those of the integumentary system were also much above the average. *Yellow Fever* had been present in the colony, particularly among the shipping, since 1861, but had not prevailed among the troops. The rains continued longer than usual and were succeeded by a hot season, which is stated to have been "the hottest known for 20 years." In the beginning of June two Companies of the 16th Regiment from Nova Scotia relieved the Detachment of the 3rd Regiment. Remittent fever soon became very

prevalent among the men, but only proved fatal in one case. In August one of the companies was removed to Trinidad, leaving a white garrison at George Town of only 72 men. On the 13th of September the first case of yellow fever among the troops occurred in the person of a hospital orderly, who died on the following day. From this time the disease continued to spread and proved very fatal, 29 cases and 15 deaths having occurred previous to the 8th of November. On that date 45 men embarked for Barbadoes leaving nine sick behind them, of whom one died on the 11th, and the remainder followed to Barbadoes about the 18th of the month. The mortality by this disease, therefore, amounted to 22 per cent. of the force in the short space of eight weeks. The removal of the men to Barbadoes was recommended at an early period of the epidemic, but through an unfortunate mistake at the Post Office, the letter, instead of being forwarded, as addressed, to Head Quarters at Barbadoes, was sent to England, and much unnecessary delay arose in consequence. A proposal to encamp the white troops at Belfield, as in the epidemic of 1861, was objected to by the senior medical officer in Demerara, because houses could not be procured there, and he was of opinion that to place the men under canvas at that season would be attended with great risk to health. Some of the convalescents were, however, sent to two houses which had been secured there during the time which elapsed before the removal of the troops was ordered. Three cases and two deaths occurred from yellow fever among 13 women, and six cases and four deaths among 14 officers. When the detachment arrived at Barbadoes it was immediately encamped at Gun Hill. No cases of yellow fever occurred there, but several admissions by remittent fever took place, which, however, yielded readily to treatment. *Windward and Leeward Command.*

The senior medical officer attributed the outbreak of the disease among the troops to the neglected drainage and filthy condition of the Thomas Estate adjoining the Eve Leary Barracks. The malaria generated from this during an unusually hot season, after the termination of the rains, acting upon the men recently arrived from Nova Scotia, reduced in health by repeated attacks of intermittent and remittent fever and by intemperate habits, developed, in his opinion, this malignant type of fever.

In the beginning of 1862, in consequence of the very sickly condition of the troops from the prevalence of fever, the white garrison was withdrawn from Demerara and was not replaced till early in 1858. The recurrence of a similar condition, and the very heavy mortality resulting from it, render it a question of some importance whether the employment of white troops in so malarious a station is indispensable, and whether it would not be more prudent, more humane, and more economical to restrict the constitution of the force employed there entirely to black troops, who are so much less susceptible to those influences which produce fevers, particularly the more aggravated and fatal types.

Dietic Diseases.—The admissions by this class were very much in excess of the average. They were all returned under the head of intemperance (*ebriositas*), and with the exception of two in the Army Hospital Corps, all occurred in the detachment of the 3rd Regiment previously to its leaving the colony in the beginning of June. In a strength of 90 men of this Corps the admissions amounted to 31 in four months. One of the cases terminated fatally. There were no cases reported under this head in the Detachment of the 16th Regiment.

Diseases of the Integumentary System were also greatly above the average in Demerara from the occurrence of cases of boil (*phlegmon*) in the 16th Regiment.

II. Black Troops.

In the middle of March a detachment of the 2nd W. I. Regiment, which had been stationed at Barbadoes, proceeded to Jamaica to join Head Quarters. In the beginning of August two companies of the 3rd W. I. Regiment landed at Barbadoes from Sierra Leone, and in the end of October a detachment of

Windward and Leeward Command.

the 4th W. I. Regiment, also from the West Coast of Africa, arrived at Demerara to relieve one of the 2nd W. I. Regiment, which immediately embarked for Jamaica.

The average annual strength of the black troops, including the Corps of Military Labourers, was 378; the admissions into hospital were 370 and the deaths 7, being in the ratio of 979 and 18·51 per 1,000 of mean strength: results not materially differing from those of 1865. One of the deaths occurred out of hospital.

The admissions and deaths by the different classes of diseases are shown in the following Table framed from Abstract No. XVII. of Appendix:—

Orders.	Diseases.	1866. Strength 378. Admitted.	1866. Strength 378. Died.	1866. Ratio per 1,000. Admitted.	1866. Ratio per 1,000. Died.	1859-65. Ratio per 1,000. Admitted.	1859-65. Ratio per 1,000. Died.
	Class I.						
1	Miasmatic Diseases	113	1	298·9	2·64	260·3	4·08
2	Enthetic „	102	..	269·8	..	257·3	..
3	Dietic „	4	..	10·6	..	·6	..
4	Parasitic „	3	..	7·9	..	7·4	..
	Class II.						
1	Diathetic Diseases	1	..	2·7	..	5·4	·44
2	Tubercular „	8	1	21·2	2.64	18·2	6·56
	Class III. Diseases of the—						
1	Nervous System	8	3	21·2	7·95	16·8	1·31
2	Circulatory „	1	..	2·7	..	2·8	1·02
3	Respiratory „	25	..	66·1	..	75·5	2·62
4	Digestive „	9	1	23·8	2·64	33·2	1·02
5	Urinary „	4	1	10·6	2·64	2·5	·58
6	Reproductive „	7	..	18·5	..	13·3	..
7	Locomotive „	..	..	..	..	2·8	..
8	Integumentary „	51	..	134·9	..	132·9	·15
	Class IV.						
4	Diseases of Nutrition	2	..	5·2	..	1·2	·29
	Class V.						
1	Accidents	31	..	82·0	..	67·3	·58
3	Homicide	..	..	..	..	·3	·44
4	Suicide	..	..	..	..	·1	·73
5	Execution	..	..	..	..	..	·15
6	Corporal Punishment	1	..	2·7	..	4·9	..
	Malingering	..	..	..	..	·1	..
	Diseases not specified	..	..	..	..	9·8	..
	Total	370	7	978·8	18·51	912·7	19·97

MIASMATIC DISEASES, although not materially above the average, have been greatly in excess of the proportion in 1865. When sub-divided, the following results are obtained:—

Windward and Leeward Command.

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 of Mean Strength. 1866. Admitted.	1866. Died.	1859-65. Admitted.	1859-65. Died.
Eruptive Fevers	..	..	..	..	19·7	·29
Paroxysmal „	15	..	39·7	..	76·1	1·60
Continued „	23	1	60·8	2·64	14·7	·58
Dysentery, Diarrhœa, and Cholera	15	..	39·7	..	16·9	1·17
Sorethroat and Influenza	8	..	21·2	..	21·6	..
Ophthalmia	10	..	26·4	..	23·2	..
Rheumatism	41	..	108·5	..	80·2	·29

There were no admissions by eruptive fevers during the year. Paroxysmal fevers were much below, and continued fevers much above the average, but both were greatly in excess of the proportion in 1865. Diarrhœa also was much above the average, but the Force employed in the Command was so small that a few admissions make a great apparent difference in the ratio. The only disease which showed a very marked increase upon the amount in 1865 was continued fever in Demerara, the admissions by which were doubled, but there was no increase in the paroxysmal fevers there, nor did any cases of yellow fever occur among the black troops. Venereal diseases were in nearly the average proportion of the preceding seven years, but were very much less prevalent than in 1865.

The following Table shows the ratio of admissions into hospital and deaths in Barbadoes and British Guiana by each of the different classes of diseases :—

Orders.	Diseases.	Annual Ratio per 1,000 of Strength in 1866. Barbadoes. Admitted.	Barbadoes. Died.	British Guiana. Admitted.	British Guiana. Died.
	Class I.				
1	Miasmatic Diseases	283·4	..	368·4	8·8
2	Enthetic „	259·1	..	333·3	..
3	Dietic „	..	..	35·1	..
4	Parasitic „	..	..	26·3	..
	Class II.				
1	Diathetic Diseases	4·1	..	..	..
2	Tubercular „	28·3	4·05	8·8	..
	Class III. Diseases of the—				
1	Nervous System	24·3	12·14	17·6	..
2	Circulatory „	4·1	..	..	..
3	Respiratory „	81·0	..	26·3	..
4	Digestive „	12·1	4·05	52·6	..
5	Urinary „	12·1	4·05	8·8	..
6	Reproductive „	28·3	..	..	..
8	Integumentary „	113·4	..	193·0	..
	Class IV.				
4	Diseases of Nutrition	..	..	17·6	..
	Class V.				
1	Accidents	44·5	..	166·6	..
6	Corporal Punishment	4·1	..	..	..
	Total	898·8	24·29	1254·4	8·8
	Average of 1859-65	1013·2	20·70	788·5	19·01

Windward and Leeward Command.

The admissions into hospital in Barbadoes were considerably lower, and in Demerara closely approximated the proportion in 1865. Venereal diseases were very much less prevalent at Barbadoes, but there was a considerable increase in the amount in Demerara.

SANITARY REPORT.

The Principal Medical Officer, writing from Barbadoes, reports that the general system of pipe drainage is in course of completion.

Additional barrack accommodation is necessary, the superficial area per man being insufficient for this climate.

At the Royal Artillery Barracks a new latrine and a wash-house are being completed.

New quarters for the married soldiers of the Battery of Royal Artillery are needed. The huts now occupied are old and out of repair; these huts are not Government property, but are handed over from one battery to the other. It is understood that quarters for these people were included in the local estimates for 1866–67.

Brick Barracks.—There are no ablution-rooms or baths for single men and officers.

The latrines and urinals have, by additional ventilation, been improved during the year; still new latrines and urinals are required, and to be flushed and put in connection with pipe drainage.

A new guard-room and a canteen are in course of erection.

Stone and Iron Barracks.—The huts are too low, and badly situated. Better accommodation should be provided for the European non-commissioned officers.

The latrines and urinals are of old construction; new ones should be erected, and put in connection with pipe drainage.

Dockyard Barracks.—The Staff-Sergeants' quarters have been enlarged, repaired, and re-distributed, thereby affording better and more comfortable accommodation.

Hospital.—The requirements are many, viz., water-closets, baths attached to the wards, and ablution-rooms.

The latrine is constructed on the old principle, and is common to the white and black troops.

II. Jamaica.

STATISTICAL REPORT.

I. White Troops.

Jamaica.

In the end of February the detachment of Royal Artillery and two companies of the 3rd Regiment, which had been sent to Jamaica in the preceding October on the outbreak of the rebellion, embarked for Barbadoes. In the middle of June a Battery of the 1st Brigade Royal Artillery from Gibraltar relieved the Battery of the 15th Brigade, which returned to England, and in the middle of August three companies of the 6th Regiment, which had been stationed at Trinidad, rejoined the head quarters in Jamaica.

The average strength of the white troops for the year was 768; the admissions into hospital from them were 1,053, and the deaths 19, of which four occurred out of hospital and one among the invalids sent to Netley. These numbers give the ratio of 1,371 admissions and 24·71 deaths per 1,000 of mean strength, being nearly identical with the results for 1865, but considerably above the average of the last seven years.

The following Table shows the influence of the different classes of diseases in causing sickness and mortality. The details for 1866 will be found in Abstract No. XVI. of Appendix.

Order.	Diseases.	1866. Strength, 768. Admissions.	Deaths. In Jamaica.	Deaths. Of Invalids.	Deaths. Total.	1866. Ratio per 1,000. Admitted.	1866. Ratio per 1,000. Died.	1859-65. Ratio per 1,000. Admitted.	1859-65. Ratio per 1,000. Died.
	Class I.								
1	Miasmatic Diseases ..	450	6	1	7	586·0	9·11	866·6	6·35
2	Enthetic „ ..	142	..	..	..	184·9	..	118·1	..
3	Dietic „ ..	27	1	..	1	35·2	1·30	31·8	·22
4	Parasitic „ ..	4	..	..	..	5·2	..	13·2	..
	Class II.								
1	Diathetic Diseases.. ..	1	..	..	..	1·3	..	3·7	·22
2	Tubercular „ ..	7	..	..	..	9·1	..	10·1	1·75
	Class III.								
	Diseases of the—								
1	Nervous System ..	19	4	..	4	24·7	5·21	21·0	1·09
2	Circulatory „ ..	3	3	..	3	3·9	3·91	6·1	·88
3	Respiratory „ ..	20	3	..	3	26·0	3·91	49·3	..
4	Digestive „ ..	53	..	..	..	69·0	..	72·9	1·53
5	Urinary „ ..	3	..	..	..	3·9	..	2·4	·22
6	Reproductive „ ..	6	..	..	..	7·8	..	3·9	..
7	Locomotive „ ..	1	..	..	..	1·3	..	3·9	·22
8	Integumentary „ ..	138	..	..	..	179·7	..	151·1	..
	Class IV.								
4	Diseases of Nutrition ..	49	..	..	..	63·8	..	18·6	..
	Class V.								
1	Accidents	125	1	..	1	162·8	1·30	133·6	·22
3	Homicide	..	..	..	..	..	..	..	·22
4	Suicide	..	..	..	..	..	..	·2	1·09
6	Corporal Punishment ..	5	..	..	..	6·5	..	3·5	..
	Diseases not specified ..	..	..	..	..	..	..	·9	..
	Total	1,053	18	1	19	1371·1	24·74	1010·9	14·01

The admissions by miasmatic and venereal diseases and those of the integumentary system, and by accidents have been considerably above the average. The high ratio of mortality has been caused by miasmatic diseases and those of the nervous, circulatory, and respiratory systems.

MIASMATIC DISEASES.—The admissions and deaths by the principal diseases of this class have been as follows :—

Diseases.	Admitted	Died.	Ratio per 1,000 of Mean Strength 1866. Admitted	1866. Died.	1859-65. Admitted	1859-65. Died.
Eruptive Fevers	..	..	..	..	·9	..
Paroxysmal „	144	1	187·5	1·30	109·5	3·50
Continued „	194	5	252·6	6·51	82·6	2·10
Yellow Fever	..	..	..	..	·4	·22
Dysentery, Diarrhœa, &c. ..	33	..	43·0	..	48·8	·22
Sorethroat and Influenza ..	40	..	52·1	..	16·7	..
Ophthalmia	10	..	13·0	..	74·0	..
Rheumatism	24	..	31·3	..	28·0	..

Jamaica. *Paroxysmal Fevers* have been considerably above the average, but much less prevalent than in 1865; the decrease, however, as compared with the latter year, has been more than compensated by an increase in *continued fevers*, which also proved a source of considerably mortality. The prevalence of fevers in both years was clearly attributable to the necessity which existed for employing white troops at some of the stations on the plains, instead of having them, as in previous years, chiefly quartered at Newcastle. Among these the principal were Up Park Camp and Port Antonio, both of which were formerly noted for the high mortality of white troops from fever. On the average of the 20 years, 1817-36, the mortality by fevers alone amounted at the former to 121, and at the latter to 126 per 1,000 annually. Both of these stations have maintained their previous reputation for unhealthiness, the admissions into hospital having been in the ratio of 2,776 per 1,000 of the mean strength at Up Park Camp, and 3,100 at Port Antonio; and the deaths in the ratio of 78·95 at the former and 125·00 at the latter. But the injurious influence of these lowland stations was not confined to themselves; the men who had served at them, and were afterwards removed to Newcastle, continued for a considerable time to exhibit a tendency to febrile attacks greatly in excess of that formerly existing at that station. The admissions into hospital and deaths by fevers, at each of the principal stations, were as follows:—

Stations	Newcastle.		Port Royal.		Up Park Camp.		Port Antonio.	
Mean Strength	459		90		76		40	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Paroxysmal Fevers	22	..	5	..	62	..	38	1
Continued Fevers	67	1	34	..	36	4	30	..
Ratio per 1,000 of Mean Strength:—								
By Paroxysmal Fevers	47·9	..	55·5	..	815·8	..	950·0	25·0
„ Continued Fevers	146·0	2·16	377·8	..	736·8	52·63	750·0	..

This shows the admissions by fevers alone, at Up Park Camp and Port Antonio, to have considerably exceeded the average strength at these stations.

Ophthalmia, which was formerly a great cause of inefficiency in Jamaica, has now been reduced to a very trifling amount, the admissions having been only in the ratio of 13 per 1,000 of the strength.

Enthetic Diseases were much above the average of the preceding seven years and 30 per 1,000 higher than in 1865, and were most prevalent at Port Royal. The increase was due to gonorrhœa, bubo, and secondary syphilis.

Diseases of Nutrition still furnish a very high proportion of cases. They were chiefly the result of attacks of malarious fever, and were returned under the head of *asthenia*.

II. Black Troops.

Several changes took place in the composition of this Force during the year. The 3rd West India Regiment arrived in March from the West Coast of Africa and relieved two companies of the 2nd West India Regiment. A detachment of the 1st West India Regiment proceeded to Africa in the end of August, being relieved by one of the 2nd West India Regiment. This detachment was

relieved by one of the same corps in the end of November, and proceeded to *Jamaica*. the Bahamas.

The average strength during the year was 954; the admissions into hospital were 1,461, and the deaths 22, of which one occurred out of hospital. These numbers give the ratio of 1531 admissions and 23·06 deaths per 1,000 of mean strength; the former differing little from, but the latter being nearly one-third higher than the ratio in 1865.

The admissions and deaths by the different classes of diseases are shown in the following Table. The details are given in Abstract No. XVII. of Appendix.

Order.	Diseases.	1866. Strength, 954. Admitted.	Died at Jamaica.	1866. Ratio per 1,000. Admitted.	Died.	1859-65. Ratio per 1,000. Admitted.	Died.
	Class I.						
1	Miasmatic Diseases.. ..	462	6	484·3	6·29	485·5	7·73
2	Enthetic „	541	..	567·1	..	358·3	·63
3	Dietic „	2	..	2·1	..	2·7	..
4	Parasitic „	18	..	18·9	..	5·6	..
	Class II.						
1	Diathetic Diseases	7	..	7·3	..	5·6	·83
2	Tubercular „	16	9	16·8	9·43	17·5	5·43
	Class III. Diseases of the—						
1	Nervous System ..	20	3	21·0	3·14	22·8	1·67
2	Circulatory „	1	1	1·0	1·05	2·9	·83
3	Respiratory „	71	1	74·4	1·05	79·8	5·01
4	Digestive „	22	1	23·1	1·05	39·1	1·89
5	Urinary „	6	..	6·3	..	4·8	·21
6	Reproductive „	25	..	26·2	..	11·9	..
7	Locomotive „	9	..	9·4	..	5·2	..
8	Integumentary „	182	..	190·8	..	117·4	·21
	Class IV.						
4	Diseases of Nutrition ..	1	..	1·0	..	2·9	·21
	Class V.						
1	Accidents	77	1	80·7	1·05	69·6	·83
3	Homicide	..	..	..	..	·4	·41
4	Suicide	..	..	..	..	..	1·05
5	Execution	..	..	..	..	..	·41
6	Corporal Punishment ..	1	..	1·0	..	4·2	..
	Diseases not specified ..	..	..	..	..	2·3	..
	Total	1,461	22	1531·4	23·06	1238·5	27·35

The admissions have been much above and the deaths under the average of the seven preceding years. The excess of the former has been chiefly in venereal diseases and those of the integumentary system, and the reduction in the latter in diseases of the respiratory system and in suicidal deaths.

MIASMATIC DISEASES.—The admissions and deaths by the principal diseases composing this class have been as follows :—

Jamaica.

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 of Mean Strength.			
			1866.		1859–65.	
			Admitted.	Died.	Admitted.	Died.
Eruptive Fevers	2	..	2·1	..	9·0	·84
Paroxysmal „	205	2	214·9	2·10	289·9	4·18
Continued „	71	2	74·4	2·10	25·3	1·25
Dysentery, Diarrhœa, & Cholera	30	2	31·4	2·10	30·1	1·04
Sorethroat and Influenza ..	17	..	17·8	..	34·5	..
Ophthalmia	38	..	39·8	..	17·9	..
Rheumatism	99	..	103·8	..	74·6	·21

While the total admissions by miasmatic diseases correspond closely with the average, there has been a considerable difference in their distribution. Paroxysmal fevers have been much less prevalent, but the reduction in them has been counterbalanced by an increase in continued fevers and in rheumatism. Compared with 1865 the decrease in paroxysmal fevers is still more marked, but the ratio of admissions by continued fevers and rheumatism is slightly higher than in that year.

Enthetic Diseases show an increase upon the very high ratio of 1865. The difference has been entirely in cases of primary syphilis.

Tubercular Diseases, which in 1865 furnished a comparatively low ratio of mortality, have again taken an important place among the causes of death of the black troops. There has, however, been a reduction in the deaths by diseases of the respiratory organs to an extent corresponding with the excess of those by tubercular diseases above the average of the seven years.

Diseases of the Integumentary System have given rise to a high ratio of admissions principally from the occurrence of ulcers of the legs, to which the black troops seem remarkably liable. It is stated by the medical officers that these have been, in some instances, due to the hard and ill-fitted leather leggings which form part of the dress of the soldier in the West India Regiments.

SANITARY REPORT.

Mr. O'Flaherty, Deputy-Inspector General of Hospitals, in his sanitary report on the military station at Jamaica, remarks:—

The troops, considering the necessity there has been for quartering more white soldiers in the lowlands than is usually the case, have partaken of the average recorded health of the several localities in which they were stationed.

In addition to Newcastle and Port Royal, the usual residences of white soldiers, Mandeville, in Manchester, about the west centre of the island, Up Park Camp, towards the east centre, and Port Antonio, at the north-east extremity, have been occupied by detachments of 2nd Battalion 6th Regiment.

The detachment of this Regiment was withdrawn from Port Antonio by order of the Major-General Commanding, owing to the sickness of the officers and men while stationed there; it was replaced by one of black soldiers, who have had good health.

Owing to the withdrawal of the 2nd Battalion 6th Regiment from Trinidad, and there being no quarters for them at Newcastle, Up Park Camp Barracks were occupied by men of that corps. Several deaths have occurred in this detachment, and Deputy-Inspector General O'Flaherty expresses his opinion that a continued occupation will prove that this barrack is as unsuited to white troops now as its previous medical history shews it to have been hitherto.

Mandeville is still to be occupied by white troops, and their residence there has proved it to be very healthy, which corresponds with its medical his-

tory during its former occupation prior to 1838. It is about 2,000 feet high, in a hilly country, having good pasturage for the rearing of cattle, horses, and sheep; it has excellent roads, but, unfortunately, no rivers; its inhabitants depend upon ponds and rain received into tanks for their water supply, and they consequently suffer much in very dry seasons. Beef and mutton are both cheap and good, and although 16 miles from the sea, fresh and corned fish are to be had almost daily and at a cheap rate. At Black River, in the vicinity of Mandeville Island, fed beef is cured and barrelled for island and export use,—a new source of trade recently inaugurated, with every prospect of success and profit to people and landholder. *Jamaica.*

Mr. O'Flaherty states the diet at Mandeville to be as follows:—Two days fresh beef, one day corned beef, two days mutton, and two days imported salt meat—pork and beef. He recommends this scale of diet, and urges the benefit that would accrue to all persons drawing rations, as well as to the inhabitants generally, by the issue of mutton twice a week to the military body, as at Mandeville, and the use of corned island beef. Soldiers would benefit by the change of diet, and the island generally would benefit by creating a market for mutton, which parts of this island can produce in any quantity, and of an excellent kind.

No medical officer attributes any sickness that has occurred to local sanitary defects of barracks, except at Port Antonio, where the existence of a neighbouring swamp is believed to be the origin of the sickness that affected the detachment of 2nd Battalion 6th Regiment.

III. Bahamas

STATISTICAL REPORT.

Until the beginning of December the garrison was furnished by the 1st, and during the remainder of the year by the 2nd West India Regiment. *Bahamas.*

The average strength of the black troops during the year was 273; the admissions into hospital amounted to 295 and the deaths to 7, of which one occurred out of hospital. These numbers show the ratio of admissions to have been 1,081, and of deaths 25·62 per 1,000 of mean strength; the former slightly above and the latter below the ratio in 1865.

The following Table, framed from Abstract No. XVII. of Appendix, shows the admissions and deaths by the different classes of diseases:—

Bahamas.

Order.	Black Troops. Diseases.	1866. Strength, 278. Admitted.	Died.	1866. Annual Ratio per 1,000. Admitted.	Died.	1859-65. Annual Ratio per 1,000. Admitted.	Died.
	Class I.						
1	Miasmatic Diseases ..	102	1	373·6	3·66	304·5	4·19
2	Enthetic „ ..	58	..	212·5	..	148·8	·76
3	Dietic „ ..	..	..	..	..	3·0	..
4	Parasitic „ ..	1	..	3·7	..	6·1	..
	Class II.						
1	Diathetic Diseases ..	5	..	18·3	..	13·3	·76
2	Tubercular „ ..	12	4	44·0	14·64	26·3	10·66
	Class III. Diseases of the—						
1	Nervous System ..	9	..	33·0	..	14·9	2·28
2	Circulatory „ ..	1	..	3·7	..	2·3	·38
3	Respiratory „ ..	51	1	186·8	3·66	79·9	6·09
4	Digestive „ ..	7	1	25·6	3·66	25·5	1·52
5	Urinary „ ..	..	..	..	..	2·7	..
6	Reproductive „ ..	3	..	11·0	..	16·8	..
7	Locomotive „ ..	1	..	3·7	..	3·4	..
8	Integumentary „ ..	26	..	95·2	..	90·2	·76
	Class IV.						
4	Diseases of Nutrition ..	..	..	..	..	1·1	..
	Class V.						
1	Accidents	19	..	69·5	..	69·7	·38
4	Suicide	..	..	..	..	·4	·38
6	Corporal Punishment ..	..	..	..	..	4·2	..
	Diseases not specified ..	..	..	..	..	3·0	..
	Total	295	7	1,080·6	25·62	816·1	28·16

The admissions by miasmatic diseases have been considerably above the average, and greatly in excess of the proportion in 1865. The increase has taken place chiefly in cases of remittent fever. Venereal diseases have also been much above the average; the difference being most marked in cases of gonorrhœa. Of the 14 cases of primary syphilis 11 occurred in the 2nd West India Regiment in December, and the disease is stated by the medical officer to have been contracted by the men before leaving Jamaica.

Tubercular diseases continue the chief cause of mortality among the black troops at this station, more than half of the deaths having been caused by pulmonary consumption. Bronchitis furnished an unusually large proportion of admissions, though less than in the preceding year.

IV. Honduras.

STATISTICAL REPORT.

Honduras. The average number of white troops employed was four, and no deaths occurred among them.

The garrison consisted of three companies of the 2nd West India Regiment till the beginning of April, when two companies were relieved by a similar number of the 3rd, and the other company was relieved in the middle of November by one of the 4th West India Regiment. The average strength during the year was 250, the admissions into hospital were 179, and the deaths

13, being in the ratio of 716 and 52 per 1,000 of mean strength. This extremely high ratio of mortality was to some extent due to losses in the field, five of the deaths having occurred in action. The deaths by disease amounted to nine, or 36 per 1,000 of the strength. *Honduras.*

The influence of the different classes of diseases, in causing sickness and mortality, is shown in the following Table, framed from Abstract No. XVII. of Appendix:

Order.	Black Troops.	1866. Strength, 250.		1866. Annual Ratio per 1,000.		1859-65. Annual Ratio per 1,000.	
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.						
1	Miasmatic Diseases ..	41	1	164·0	4·00	452·1	2·25
2	Enthetic „ ..	44	..	176·0	..	108·9	..
3	Dietic „ ..	..	..	..	..	2·7	1·35
4	Parasitic „ ..	3	..	12·0	..	12·1	..
	Class II. ..						
1	Diathetic Diseases ..	3	..	12·0	..	4·1	..
2	Tubercular „ ..	2	3	8·0	12·00	6·3	3·15
	Class III. Diseases of the—						
1	Nervous System ..	5	2	20·0	8·00	15·7	2·70
2	Circulatory „ ..	2	1	8·0	4·00	3·1	2·24
3	Respiratory „ ..	14	1	56·0	4·00	52·2	1·35
4	Digestive „ ..	4	..	16·0	..	39·6	·90
5	Urinary „ ..	..	..	..	..	2·7	..
6	Reproductive „ ..	1	..	4·0	..	15·3	..
7	Locomotive „ ..	..	..	..	..	3·6	..
8	Integumentary „ ..	26	..	104·0	..	155·7	·45
	Class IV.						
4	Diseases of Nutrition..	..	..	..	..	1·3	..
	Class V.						
1	Accidents	24	..	96·0	..	91·3	·90
2	Battle	10	5	40·0	20·00	..	..
3	Homicide	..	..	..	..	..	·45
4	Suicide	..	..	..	..	·9	·90
5	Execution	..	..	..	..	..	·45
6	Corporal Punishment..	..	..	..	..	5·4	..
	Diseases not specified..	..	..	..	..	1·3	·45
	Total ..	179	13	716·0	52·00	974·3	17·54

The admissions have been considerably under the average, but there is reason to believe that the returns are imperfect, and no means exist of correcting them. The mortality, exclusive of deaths in the field, was much above the average, consumption being the most fatal of the diseases.

In the end of November, in consequence of an inroad having been made into the colony by a party of Indians, who took some prisoners for whom they demanded a ransom, an expedition was decided upon to San Pedro and Indian Town, about 50 or 60 miles from Belize, where the insurgents had established their head quarters. Accordingly, on the 11th of December, a force under Major Mackay started from Belize to proceed to San Pedro by the Old River, while another was sent by the Rio Hondo to Blue Creek. The first division was put in charge of a civilian medical practitioner by whom no returns or reports were ever furnished, and, in consequence of this, we have no information respecting the health of, or casualties among, the men except the nominal return of deaths furnished by the commanding officer. A diary was carefully

Honduras. kept by the medical officer in charge of the other division, Dr. Hunter, a civilian practitioner, who was in medical charge of the troops at Belize when the expedition was organized, there being no military surgeon present.

In this diary it is stated that, so far as Dr. Hunter could learn, the first division, which, as already mentioned, started on the 11th, reached Orange Walk, on Old River, about the 19th of December, and on the night of the 20th started for San Pedro, across country through the bush, by paths beset with difficulties. On the following morning while halting for breakfast, about four miles from San Pedro, it was unexpectedly attacked by the Indians, and, after some firing, was compelled to retire and fall back upon Orange Walk, leaving four soldiers and one or two civilians, who went as carriers, dead on the field. The Commissioner who accompanied the Force was missing, and has never since been heard of; he is supposed to have been left behind and to have died in the bush. After waiting for the stragglers to come in, the force embarked in their boats, and, about midnight, started to return to Belize, which they reached on the evening of the 23rd of December. As already stated, no information can be obtained respecting the health of the men.

The second division left Belize on the 12th of December, in a steamer, for the Rio Hondo, and reached Blue Creek on the afternoon of the 15th. On the 16th the troops disembarked and marched a distance of four or five miles to Panting's Bank, a mahogany cutters' station, where they were housed. On the 18th they started from Panting's Bank to proceed to the River Bravo, about 20 miles distant. The route lay through dense bush, and the rain which fell during the night before the march had made the ground so soft that the path soon became a perfect quagmire. In the afternoon they reached the Bravo and took up their quarters in some old stores, where they waited two days in expectation of provisions reaching them, which were to have been sent by boat from Blue Creek. As these did not arrive, and there were no means of obtaining any on the spot, they retraced their steps on the 20th to Panting's Bank. On the 25th they received orders to return to Belize without delay, as it was supposed that place was in danger of a visit from the Indians. Accordingly, on the 26th, they embarked in the steamer and reached Corozal on the afternoon of the following day. Dr. Hunter reports that notwithstanding the exposure of the men during the most trying season of the year, they enjoyed good health. Quinine was given them as a prophylactic, and appears to have been of great use in warding off attacks of fever. The marked success which attended the careful arrangements for the health of this division renders it the more unfortunate that we have no details respecting the events which occurred during the march of the other.

ENTHETIC DISEASES were considerably above the average of former years, the excess being in cases of primary syphilis.

ACCIDENTS AND VIOLENCE.—The admissions for gun shot wounds were cases which returned from San Pedro after the unfortunate issue of that expedition. They were seven in number, and one of them ultimately terminated fatally. They are stated to have been chiefly inflicted by buck and swan shot. The fatal case was a man in whom the right lung was wounded.

Section II.

On the Extent of Invaliding.

West Indies. Of the white troops serving in the West Indies, during 1866, there were 10 men sent to England as invalids from the Windward and Leeward Command, and 24 from Jamaica, being respectively in the ratio of 11·26 and 31·25 per 1,000 of mean strength. During the same period 3 invalids from the Windward and Leeward Command and 11 from Jamaica were finally discharged the service at Netley, being in the ratio of 3·38 and 14·32 per 1,000 of strength.

Of the black troops serving in the West Indies and Western Africa 22, or 7·37 per 1,000 of the strength employed in these Commands, were discharged as invalids.

The disabilities of the men sent to England and of those discharged the *West Indies* service are shown in the following Table, framed from Abstract No. XVIII. of Appendix.

	White Troops.				Black Troops.
	Windward and Leeward Command.	Jamaica.	Windward and Leeward Command.	Jamaica.	West Indies and Western Africa.
Mean Strength	888.	768.	888.	768.	2,984.
Classes of Disabilities ..	Invalids sent Home.	Invalids sent Home.	Discharged as Invalids at Netley.	Discharged as Invalids at Netley.	Discharged as Invalids in the Colonies
Paroxysmal Fevers	1	..	..	..	..
Rheumatism	..	1	..	..	4
Venereal Diseases	..	2	..	..	4
Diathetic „	..	..	..	1	..
Tubercular „	1	1	1	2	4
Diseases of the—					
Nervous System	3	3	1	2	1
Circulatory „	2	1	1	2	..
Respiratory „	..	1	..	2	1
Digestive „	..	3	..	..	..
Locomotive „	..	1	..	1	2
Integumentary „	..	2	..	1	1
Diseases of Nutrition	3	9	..	..	2
Accidents and Violence ..	..	..	..	..	3
Total	10	24	3	11	22
Ratio per 1,000 of { 1866 ..	11·26	31·25	3·38	14·32	7·37
Mean Strength .. { 1860-65	28·86	26·38	23·34	22·83	18·39

The ratio of invalids sent home from the Windward and Leeward Command was much below the average, but this may have been due in some degree, at least, to the regiment serving there having returned to England in the middle of the year, taking with it men who would otherwise have been invalided. The proportion invalided from Jamaica was above the average; the chief disability was *asthenia*, the result of malarious fevers. The ratio of invaliding among the black troops was very low; syphilis, rheumatism, and consumption were the chief causes.

Section III.

Mean Daily Sick.

The mean daily sick of the white troops in the Windward and Leeward Command was 62, and in Jamaica 48. Among the black troops the numbers were 19 in the Windward and Leeward Command, 72 in Jamaica, 15 in the Bahamas, and 8·5 in Honduras. On these numbers the usual calculations have been made, and the results are shown in the following Table:—

West Indies.

		White Troops.		Black Troops.			
		Windward and Leeward Command.	Jamaica.	Windward and Leeward Command.	Jamaica.	Bahamas.	Honduras.
Ratio per 1,000 constantly Sick.	1866 ..	69·82	62·50	50·26	75·47	54·95	34·00
	1859–65 ..	46·36	39·64	41·02	58·28	47·72	34·45
		days.	days.	days.	days.	days.	days.
Mean Sick Time to each Soldier.	1866 ..	25·48	22·81	18·35	27·55	25·05	12·41
	1859–65 ..	17·31	14·47	16·07	21·77	17·42	12·58
Average Duration of the Cases.	1866 ..	15·74	16·63	18·74	17·99	18·56	17·33
	1859–65 ..	14·57	14·31	17·60	17·18	21·40	12·64

Although the proportion constantly sick and the mean sick time to each white soldier have been greatly above the average, they have not differed much from the results in 1865. The excess above the average was probably due to the great prevalence of fever in both Commands, and of diarrhœa also in the Windward and Leeward Command. The marked reduction, compared with 1865, in the mean daily sick of the black troops in the Windward and Leeward Command, was the result of the great decrease in the proportion of venereal diseases, while to the same diseases was attributable the increased ratio in Jamaica. The returns from Honduras are, unfortunately, not to be relied on as the sick of the expedition to San Pedro, and also of some detachments from Belize during the year appear to have been omitted.

V.—ON THE HEALTH OF THE TROOPS SERVING IN WESTERN AFRICA.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

Western Africa.

DURING the course of the year the 3rd and 4th West India Regiments were relieved by the 1st and 2nd from the West Indies.

The white troops averaged about 15 during the year. Only one died, a Company Sergeant-Major of the 3rd West India Regiment, of dysentery, at Accra.

The average strength of the black troops, and the admissions into hospital and deaths at each station, were as follows:—

	Average Strength.	Admissions into Hospital.	Deaths	Ratio per 1,000 of Strength.		1859–65. Ratio per 1,000.	
				Admitted	Died.	Admitted	Died.
Sierra Leone ..	198	689	14	1383·5	28·12	875·8	27·15
The Gambia ..	210	270	11	1285·7	52·38	1169·8	29·97
Lagos, and The Gold Coast	421	839	18	1992·9	42·78	1382·7	47·74

The admissions at all the stations have been much above the average, but at the Gambia they have been very slightly in excess of the proportion in 1865; the mortality, however, at that station has been very high, the result of losses on active service. The mortality at Sierra Leone and the Gold Coast, though higher than in 1865, has not differed materially from the average.

The following Table, framed from Abstract No. XIX. of Appendix, shows the influence of the different classes of diseases on the sickness and mortality:—

Orders.	Stations / Strength / Diseases.	Sierra Leone. 498.						Gambia. 210.						Gold Coast and Lagos. 421.					
				1866. Annual Ratio per 1,000.		1859–65. Annual Ratio per 1,000.				1866. Annual Ratio per 1,000.		1859–65. Annual Ratio per 1,000.				1866. Annual Ratio per 1,000.		1859–65. Annual Ratio per 1,000.	
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.																		
1	Miasmatic Diseases	120	2	241·0	4·02	251·4	4·94	101	1	481·0	4·76	518·3	4·29	390	6	926·4	14·25	643·2	25·42
2	Enthetic ,,	267	1	536·2	2·01	204·9	..	61	1	290·5	4·76	218·6	1·43	186	..	441·8	..	200·9	..
3	Dietic ,,	..	..	..	..	1·7	·71	..	..	..	..	3·3	..	..	..	..	..	4·0	·28
4	Parasitic ,,	61	..	122·5	..	31·4	..	6	..	28·6	..	14·3	..	15	..	35·6	..	114·4	..
	Class II.																		
1	Diathetic Diseases	2	..	4·0	..	4·6	..	1	..	4·8	..	10·5	1·43	4	..	9·5	..	10·7	·85
2	Tubercular ,,	11	2	22·1	4·02	16·2	7·05	1	2	4·8	9·53	10·5	6·19	10	2	23·7	4·75	12·1	6·22
	Class III. Diseases of the—																		
1	Nervous System	4	..	8·0	..	14·8	2·47	4	..	19·0	..	13·8	1·43	13	1	30·9	2·38	18·9	2·26
2	Circulatory ,,	..	..	..	..	·7	..	..	..	..	..	1·9	·95	..	..	..	..	1·7	·85
3	Respiratory ,,	26	5	52·2	10·04	67·0	4·23	17	1	80·9	4·76	113·7	8·09	31	3	73·6	7·12	62·7	5·09
4	Digestive ,,	15	3	30·1	6·02	26·8	4·23	2	..	9·5	..	37·6	2·86	18	..	42·8	..	38·7	1·98
5	Urinary ,,	2	..	4·0	..	3·9	·35	1	1	4·8	4·76	8·0	·47	6	1	14·3	2·38	3·7	..
6	Reproductive ,,	9	..	18·1	..	15·9	..	4	..	19·0	..	14·8	..	12	..	28·5	..	12·7	..
7	Locomotive ,,	17	..	24·1	..	12·0	·35	2	..	9·5	..	8·6	·47	5	1	11·9	2·38	7·1	..
8	Integumentary ,,	111	..	222·9	..	148·1	..	45	..	214·3	..	122·7	..	98	..	232·8	..	163·1	..
	Class IV.																		
4	Diseases of Nutrition	3	..	6·0	..	·7	·35	..	..	..	..	1·9	..	1	1	2·4	2·38	1·1	..
	Class V.																		
1	Accidents	40	1	80·3	2·01	56·1	·35	12	..	57·1	..	69·0	..	47	1	111·6	2·38	69·5	2·54
2	Battle	..	..	..	..	13·0	1·06	13	4	61·9	19·05	5·2	..	..	..	..	..	4·8	·28
3	Homicide	..	..	..	..	..	..	..	..	..	..	·5	·47	..	..	..	..	..	·56
4	Suicide	..	..	..	..	·3	1·07	..	1	..	4·76	·5	·95	1	1	2·4	2·38	..	·56
5	Execution	..	..	..	..	..	..	..	..	..	..	..	·47	..	..	..	..	..	·85
6	Corporal Punishment	1	..	2·0	..	5·3	..	..	..	..	..	2·8	..	2	..	4·7	..	7·6	..
	Malingering	..	..	..	..	..	..	..	..	..	..	·5	..	..	..	..	..	..	..
	Cause not specified	..	..	..	..	1·0	..	..	..	..	..	2·8	·47	..	1	..	2·38	·8	..
	Total	689	14	1383·5	28·12	875·8	27·15	270	11	1285·7	52·38	1169·8	29·97	839	18	1992·9	42·78	1882·7	47·74

MIASMATIC DISEASES have been greatly above the average on the Gold Coast and at Lagos, but slightly under it at Sierra Leone and the Gambia. When subdivided they furnish the following results:—

Diseases.	Sierra Leone.			The Gambia.			The Gold Coast and Lagos.		
	Admitted in 1866.	Ratio per 1,000 Admitted.		Admitted in 1866.	Ratio per 1,000 Admitted.		Admitted in 1866.	Ratio per 1,000 Admitted.	
		1866.	1859-65.		1866.	1859-65.		1866.	1859-65.
Eruptive Fevers	4	8·0	12·3	..	..	30·9	..	..	3·9
Paroxysmal „	45	90·4	122·0	68	323·8	302·6	231	548·7	329·9
Continued „	2	4·0	1·8	..	..	5·2	..	..	1·1
Dysentery and Diarrhœa ..	26	52·2	30·3	13	61·9	91·3	118	280·3	215·3
Sorethroat and Influenza ..	6	12·0	4·6	3	14·3	13·8	..	..	9·3
Ophthalmia	15	30·1	11·6	4	19·0	18·6	10	23·7	19·8
Rheumatism	21	42·3	59·6	13	61·9	47·1	25	59·4	54·8

The troops were remarkably free from eruptive fevers during the year, only four admissions having taken place, all at Sierra Leone. Three were cases of small-pox and one of chicken-pox, and all recovered. Paroxysmal fevers were under the average in Sierra Leone, slightly over it at the Gambia, but much in excess of it at the Gold Coast and Lagos, chiefly from the great prevalence of remittent fever at the latter station. It is worthy of remark that, though yellow fever was extremely fatal to the white population of Sierra Leone, and to the European sailors there, no cases of it occurred among the black troops. Dysentery and diarrhœa were more prevalent than usual at Sierra Leone and on the Gold Coast. Dysentery was very prevalent at Cape Coast Castle, and diarrhœa at Lagos.

ENTHETIC DISEASES.—The admissions by venereal diseases at Sierra Leone and the Gold Coast were considerably more than double the average. At the former, the excess was chiefly in cases of syphilis, which was also the predominant form at Lagos, but on the Gold Coast gonorrhœa was much the most prevalent. The increase in these diseases is attributed to the arrival of the regiments from the West Indies, where they are unfortunately too prevalent.

PARASITIC DISEASES.—The admissions were double the average proportion at Sierra Leone and the Gambia. At the former one half the cases were *itch*, and the other half *Guinea worm*, but the latter are stated to have been mostly contracted during service on the Gold Coast.

DISEASES OF THE INTEGUMENTARY SYSTEM have been much above the average at all the stations, owing to the large number of cases of ulcers which have been admitted. The medical officers, in commenting upon these, state that while they are, no doubt, "partly attributable to constitutional taint," they are also partly due to "the generally hard and ill-fitting leather leggings."

ACCIDENTS AND VIOLENCE.—The ratio of mortality by this class at the Gambia was greatly raised by four deaths in the field. In the end of June a force, consisting of 6 officers and 150 men of the 4th West India Regiment, was sent from Bathurst to a town called Albreda, about 15 miles up the river; there an engagement took place in which an officer and three men were killed, and another officer and 13 men were wounded. The officer and one man died subsequently of their wounds. Of the four killed, two were shot through the head, one through the chest, and one through the abdomen; of the 14 wounded, one was wounded in the head, five (of whom one subsequently died) were wounded in the abdomen, two in the upper and five in the lower extremities. Several severe cases of inflammation of the lungs are stated to have occurred from exposure of the men to rain on this expedition.

Western Africa. The invaliding from this Command has already been shown in connection with that from the West Indies.

Section III.

Mean Daily Sick.

The number constantly non-effective from sickness, during the year was 29 at Sierra Leone, 14 at the Gambia, and 26 at the Gold Coast and Lagos. The following Table gives the usual information deduced from these data :—

		Sierra Leone.	The Gambia.	The Gold Coast and Lagos.
Ratio per 1,000 constantly Sick ..	1866 ..	58·23	66·67	61·76
	1861–65..	40·46	46·59	62·42
		days.	days.	days.
Average Sick Time to each soldier ..	1866 ..	21·25	24·33	22·54
	1861–65..	14·77	17·01	22·78
Average Duration of Cases of Sickness	1866 ..	15·36	18·93	11·31
	1861–65..	15·08	12·82	14·90

The mean daily sick and average sick time to each soldier have been much above the average of the five preceding years at Sierra Leone and the Gambia, and at the latter station the duration of the cases in hospital has also greatly increased. At Sierra Leone the duration of the cases has been slightly above, and on the Gold Coast and at Lagos considerably under the average. At the latter stations the mean daily sick and average sick time correspond closely with the results of previous years.

VI.—ON THE HEALTH OF THE TROOPS SERVING IN THE ISLAND OF ST. HELENA.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

St. Helena. The garrison consisted of a battery of the 2nd Brigade Royal Artillery, a company of Royal Engineers, and three companies of an Infantry Regiment, the head quarters of which were stationed at the Cape of Good Hope. Early in August the detachment of the 1st Battalion 10th, which had been in the Island about 18 months, was relieved by a detachment of the 2nd Battalion 5th Regiment. The mean strength during the year was 360, the admissions into hospital were 281, and the deaths 3; being in the ratio of 781 and 8·34 per 1,000 of the strength. One of the deaths occurred out of hospital.

The following Table, framed from Abstract No. XX. of Appendix, shows the admissions and deaths by the different classes of diseases :—

Order.	Diseases.	Strength, 360. Admitted.	Died. At St. Helena.	Died. Of Invalids.	Died. Total.	Ratio per 1,000 of Strength. 1866. Admitted.	1866. Died.	1859–65. Admitted.	1859–65. Died.
	Class I.								
1	Miasmatic Diseases ..	45	..	..	..	125·0	..	314·5	2·59
2	Enthetic „ ..	87	..	..	..	241·6	..	119·9	..
3	Dietic „ ..	16	..	..	..	44·5	..	38·1	·26
4	Parasitic „ ..	2	..	..	..	5·6	..	3·4	..
	Class II.								
1	Diathetic Diseases ..	2	..	..	..	5·6	..	4·7	·26
2	Tubercular „	4	..	..	..	11·1	..	6·2	1·82
	Class III. Diseases of the—								
1	Nervous System ..	14	..	..	..	38·9	..	24·4	1·55
2	Circulatory „ ..	11	1	..	1	30·5	2·78	7·8	·26
3	Respiratory „ ..	19	..	..	..	52·8	..	43·0	1·04
4	Digestive „ ..	18	..	..	..	50·0	..	57·6	·52
5	Urinary „ ..	1	..	..	..	2·8	..	4·4	..
6	Reproductive „ ..	5	..	..	..	13·9	..	3·9	..
7	Locomotive „ ..	..	..	..	..	..	..	1·8	..
8	Integumentary „ ..	14	..	..	..	38·8	..	68·0	..
	Class V.								
1	Accidents	41	1	..	1	113·9	2·78	115·3	1·55
3	Suicide	1	1	..	1	2·8	2·78	1·3	..
6	Corporal Punishment ..	1	..	..	..	2·8	..	..	..
	Diseases not specified ..	..	..	..	..	..	..	3·1	..
	No appreciable disease ..	..	..	..	..	..	..	·5	..
	Total	281	3	..	3	780·6	8·34	847·9	9·85

MIASMATIC DISEASES have not occasioned half as many admissions as in 1865. When sub-divided they furnish the following results:—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength. 1865. Admitted.	1865. Died.	1859–65. Admitted.	1859–65. Died.
Eruptive Fevers	..	..	..	..	..	..
Paroxysmal „	1	..	2·8	..	22·0	..
Continued „	12	..	33·3	..	101·5	..
Dysentery and Diarrhœa ..	10	..	27·8	..	85·9	..
Sorethroat and Influenza ..	4	..	11·1	..	20·7	..
Ophthalmia	9	..	25·0	..	25·9	..
Rheumatism	5	..	13·9	..	28·3	..

The reduction in the prevalence of this class appears to have extended to all the principal diseases composing it, except ophthalmia. The medical officer in charge is unable to assign any satisfactory reason for this improvement.

St. Helena. ENTHETIC DISEASES, though greatly in excess, show a large reduction on the proportion of admissions from the same cause in 1865. The reduction has been principally in cases of gonorrhœa.

ACCIDENTS AND VIOLENCE.—Two of the three deaths were by this class. An Artillery man was accidentally drowned on duty by the upsetting of a boat, and a Sapper committed suicide by cutting his throat.

SANITARY REPORT.

The Senior Medical Officer complains of the site of the James Town Barracks at the upper part of the James Valley, in a neighbourhood covered by the wretched habitations of poor people. He considers this position as hot, close, and confined, and not favourable to health. The upper rooms are very defective in ventilation, which is upon the old plan, and they possess no windows; they require ridge ventilation, side inlets, and windows. Inspector-General Dr. Lawson, on his inspection, made several recommendations on these subjects.

Invaliding. INVALIDING.—There were 41 invalids sent to England during the year, and 16 finally discharged the service at Netley, being respectively in the ratio of 113·9 and 44·5 per 1,000 of mean strength. The very high ratio of invalids sent home was due to the invaliding of the Royal Engineers, 27 men, or two-thirds of the whole, having been sent from the 23rd Company of that corps.

The disabilities for which the men were invalided, and discharged the service, are stated in Abstract No. XXI. of Appendix, from which the following classified summary has been prepared :—

Diseases.	Invalids Sent Home from St. Helena.	Discharged the Service at Invalid Depôt.
Continued Fever	2	..
Chronic Dysentery	3	..
Ophthalmia	1	..
Chronic Rheumatism	2	1
Venereal Diseases	..	1
Dietic Diseases	..	..
Tubercular	6	2
Diseases of the—		
Nervous System	2	1
Circulatory	14	9
Respiratory	2	1
Digestive	2	..
Urinary	1	..
Locomotive	1	1
Debility	5	..
Total	41	16
Ratio per 1,000 of Mean Strength { 1866 ..	113·9	44·5
Ratio per 1,000 of Mean Strength { 1860-65 ..	10·0	22·7

The numbers invalided and discharged have been greatly in excess of the average. Diseases of the circulatory system have been the chief disability, particularly disease of the valves of the heart and varicose veins. As already stated 27 of the men sent home were from the company of Royal Engineers, numbering only 98. The medical officer remarks that "hard work, bad, unhealthy workshops, and cold, comfortless dinners appear to have been prominent causes."

The average number constantly non-effective from sickness during 1866 was 16·5, or 45·83 per 1,000 of the strength. The mean sick time to each soldier was 16·73 days, and the average duration of the cases was 21·43 days. The mean daily sick has been 10 per 1,000, and the mean sick time to each soldier 3¼ days below the proportion in 1865; but the average duration of the cases has been nearly identical in the two years. *St. Helena. Mean Daily Sick.*

The following Table shows the influence of age on the mortality of the troops serving in this island :— *Influence of Age.*

		Under 20.		20–24.		25–29.		30–34.		35–39.		40 and upwards.	
		Strength on 1st Jan.	Died during Year.	Strength on 1st Jan.	Died during Year.	Strength on 1st Jan.	Died during Year.	Strength on 1st Jan.	Died during Year.	Strength on 1st Jan.	Died during Year.	Strength on 1st Jan.	Died during Year.
Troops..		17	..	89	1	187	..	49	1	28	1	11	..
Ratio of Deaths per 1,000 of Strength ..	1866 .	..		11·24		..		20·41		35.71		..	
	1861-5	..		5·10		9·17		21·41		8·20		..	

VII.—ON THE HEALTH OF THE TROOPS SERVING AT THE CAPE OF GOOD HOPE.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

In March a company of Royal Engineers embarked for England. In the middle of July the 2nd Battalion 11th Regiment arrived from China, and relieved the 67th, which returned home. In July three companies of the 2nd Battalion 5th Regiment embarked for St. Helena to relieve a similar detachment of the 1st Battalion 10th, which rejoined the head quarters at the Cape. *Cape of Good Hope.*

The average strength of the troops during the year was 4,135; the admissions into hospital were 4,215, and there were 44 deaths, of which four occurred out of hospital and three among invalids sent to England. The ratio of admissions was 1,019, and of deaths 10·62 per 1,000 of mean strength, both lower than in 1865.

The admissions and deaths were distributed among the different corps as follows :—

	Average Annual Strength.	Admissions into Hospital.	Deaths.				Annual Ratio per 1,000 of Mean Strength.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Royal Artillery	110	127	1	..	..	1	1,154	9·10
Royal Engineers ..	216	181	..	..	..	..	838	..
2nd Bat. 5th Regiment.	662	602	9	..	..	9	909	13·60
1st Bat. 9th „	676	1,059	4	1	2	7	1,567	10·36
1st Bat. 10th „	585	476	4	1	..	5	814	8·55
2nd Bat. 11th „	249	440	9	1	..	10	1,767	40·16
67th Regiment	392	375	3	..	..	3	957	7·67
99th „	656	413	5	..	..	5	630	7·62
Cape Mounted Rifles ..	482	519	1	1	1	3	1,077	6·22

Cape of Good Hope.

The other death was that of a Sergeant of the Commissariat Staff Corps.

The highest proportion, both of admissions and deaths, was in the 2nd Battalion 11th Regiment, which arrived about the middle of July in a very sickly condition from China, to the climate of which station, and not of the Cape, the high ratio of sickness and mortality was due. But the proportion of admissions was also extremely high in the 1st Battalion 9th Regiment, not however, from any injurious influence of climate on the health, but from the excessive prevalence of venereal diseases, which were the cause of upwards of half the cases admitted into hospital in that corps.

The influence of the different classes of diseases in producing sickness and mortality is shown in the following Table. The details for 1866 will be found in Abstract No. XX. of Appendix.

Order.	Diseases.	1866. Mean Strength, 4,135. Admitted.	Deaths. At Cape.	Deaths. Of Invalids.	Deaths. Total.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	1859-65. Ratio per 1,000 of Mean Strength. Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	1,076	13	..	13	260·2	3·14	276·2	2·37
2	Enthetic „ ..	1,426	..	..	..	344·9	..	234·8	·03
3	Dietic „ ..	74	2	..	2	17·9	·48	14·9	·45
4	Parasitic „ ..	34	..	..	..	8·2	..	10·9	..
	Class II.								
1	Diathetic Diseases ..	23	..	..	..	5·6	..	3·7	·07
2	Tubercular „ ..	39	8	1	9	9·4	2·18	9·0	1·35
	Class III. Diseases of the—								
1	Nervous System ..	97	1	1	2	23·5	·48	24·3	1·27
2	Circulatory „ ..	67	8	..	8	16·2	1·94	18·7	1·89
3	Respiratory „ ..	149	2	1	3	36·0	·72	49·5	·83
4	Digestive „ ..	193	5	..	5	46·7	1·20	46·8	·76
5	Urinary „ ..	4	..	..	..	1·0	..	2·0	·14
6	Reproductive „ ..	59	..	..	..	14·3	..	9·7	..
7	Locomotive „ ..	15	..	..	..	3·6	..	4·5	..
8	Integumentary „ ..	510	..	..	..	123·1	..	109·0	..
	Class IV.								
4	Diseases of Nutrition ..	9	..	..	..	2·2	..	·7	..
	Class V.								
1	Accidents	423	2	..	2	102·3	·48	89·6	1·41
3	Homicide	..	..	..	..	..	..	..	·10
4	Suicide	1	..	..	..	·3	..	..	·17
5	Execution	..	..	..	..	..	..	..	·03
6	Corporal Punishment ..	16	..	..	..	3·9	..	3·4	..
	Diseases not specified ..	..	..	..	..	..	..	5·8	..
	Total	4,215	41	3	44	1019·3	10·62	913·5	10·87

The admissions have been one-tenth higher than the average of the seven preceding years, the difference being chiefly in venereal diseases.

MIASMATIC DISEASES.—The admissions and deaths by the principal diseases comprised in this class have been as follows:—

Cape of Good Hope.

Diseases.	Admitted	Died.	Annual Ratio per 1,000 of Strength. 1866. Admitted	1866. Died.	1859-65. Admitted	1859-65. Died.
Eruptive Fevers	2	..	·5	..	1·3	·03
Paroxysmal ,, ...	65	..	15·7	..	16·2	·07
Continued ,, ...	179	8	43·3	1·93	43·7	1·15
Dysentery, Diarrhœa, and Cholera	175	5	42·3	1·21	43·6	1·09
Sorethroat and Influenza ..	85	..	20·6	..	23·9	..
Ophthalmia	245	..	59·3	..	84·0	..
Rheumatism	268	..	64·8	..	39·9	..

These ratios so closely approximate the average of the preceding seven years, except those of ophthalmia and rheumatism, as scarcely to require any special observation. The admissions by *paroxysmal fevers*, though slightly under the average, represent a proportion greatly in excess of what is due to the climate of the Cape. Of the 65 cases under this head 39 occurred in the 2nd Battalion 11th Regiment, which, as already stated, arrived in a very sickly condition from China, where the liability to this form of fever had been contracted. Upwards of one-third of the cases of diarrhœa also occurred in thesame corps.

Ophthalmia, though considerably below the average, has been more prevalent than in 1865. The Cape Mounted Rifles furnished much the highest proportion of cases, the admissions having been in the ratio of 177 per 1,000 of the strength. The 2nd Battalion 5th and 1st Battalion 10th Regiments also suffered considerably, the ratio in them having been 59 and 60 per 1,000. The cause of this prevalence of the disease has not been satisfactorily explained.

Rheumatism gave rise to a much larger proportion of admissions than formerly. The corps in which the excess occurred were the 9th, 11th, and 67th, in which the ratio of cases per 1,000 of strength was 94·7, 156·6, and 137·7. There is no obvious cause for this marked difference between the various corps or for the very high ratio in the 11th and 67th Regiments.

Exthetic Diseases have been greatly above the average, and have exceeded even the very high ratio in 1865. This, however, has been chiefly owing to their prevalence in one corps, the 1st Battalion 9th Regiment, quartered throughout the year at Cape Town. In it no less than 572 cases were admitted during the year, being in the ratio of 846 per 1,000 of mean strength. Of the cases 385 might be classed as syphilitic and 187 as gonorrhœal. If this corps be deducted the admissions among the rest of the Force would amount to 247 per 1,000 of the strength, being very slightly in excess of the average of the preceding seven years.

Diseases of the Integumentary System, though considerably above the average, furnished exactly the same proportion of cases as in 1865. The 11th, 67th, 99th, and Cape Mounted Rifles were the corps in which these diseases were most prevalent.

SANITARY REPORT.

There is nothing in the sanitary reports from this command which has not been referred to on previous occasions.

Inspector-General Dr. Lawson reports, that considerable additions have been made during the year to the means for ventilation at Cape Town, Graham's Town, and Fort Beaufort. Some new and improved huts have been erected at King William's Town, and some cooking stoves introduced. The improvements proceed as fast as the sums sanctioned for them at home will allow, and they will ultimately be extended to all the barracks in the Command.

Note.—Dr. Lawson has contributed some remarks on the causes of aneurism and diseases of the heart among the troops in South Africa, which will be found in the Appendix, page 548.

Section II.

On the Extent of Invaliding.

Cape of Good Hope.

During the year 70 men were sent to England as invalids, and four invalids were discharged the service at the Cape and 68 at Netley. The proportion sent home, therefore, was 16·9, and discharged the service 17·4 per 1·000 of mean strength. The following Table, framed from Abstract No. XXI. of Appendix, shows the classes of disabilities for which the men were invalided and discharged :—

Disabilities of	Invalids sent to England.	Invalids Discharged the Service.	
		At the Cape.	At Netley.
Paroxysmal Fevers	1	..	1
Dysentery and Diarrhœa	2	..	..
Ophthalmia..	3	..	6
Rheumatism	11	..	4
Venereal Diseases	5	2	5
Diathetic „	4	..	..
Tubercular „	5	..	14
Diseases of the—			
Nervous System	3	..	2
Circulatory „	14	..	13
Respiratory „	7	1	3
Digestive „	2	..	4
Urinary „	1	..	..
Reproductive „	..	..	1
Locomotive „	5	..	3
Integumentary „	3	..	4
Diseases of Nutrition	2	..	4
Accidents and Violence	2	1	2
Total	70	4	68
Ratio per 1,000 of Mean Strength .. 1866 ..	16·9	1·0	16·4
Ratio per 1,000 of Mean Strength .. 1861-5	29·0	2·6	20·0

The proportion invalided to England and discharged has been considerably under the average. Diseases of the circulatory system and rheumatism have been the chief disabilities among the former, and tubercular diseases and those of the circulatory system among the latter. Ophthalmia, which formerly was a prominent, has now become a very minor cause of invaliding.

Section III.

Mean Daily Sick.

The average number constantly sick during the year was 217, or, 52·48 per 1,000 of mean strength. The following Table gives the usual information on this head for 1866 and the average of the six preceding years :—

	1866.	1860–65.
Ratio per 1,000 of Strength constantly Sick	52·48	48·61
Average Sick time to each Soldier	days. 19·15	days. 17·74
Average duration of cases of Sickness	18·79	19·75

Although the proportion constantly sick and the sick time to each soldier have been above the average of the six preceding years, they have been lower than in 1865. The excess above the average has probably been due in both years to the sickly condition of the Regiments which came to the Cape from China. *Cape of Good Hope.*

Section IV.

Influence of Age on the Mortality.

The strength, and deaths by ages, of the corps which served in the Command throughout the year, are stated in Abstract No. XXII. of Appendix, and the results are given in the following Table :—

		Under 20	20 and under 25.	25 and under 30.	30 and under 35.	35 and under 40.	40 and upwards.
Ratio of Deaths per 1,000 living ..	1866 ..	..	5·42	12·48	8·37	28·99	..
	1859-65	3·51	7·95	10·74	14·77	17·91	38·96

These results show a considerable deterioration of life with the advance of age as the result of military service in the Colony.

VIII.—ON THE HEALTH OF THE TROOPS SERVING IN THE ISLAND OF MAURITIUS.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

Mauritius. In the end of February one company of Royal Engineers embarked for England, and in the beginning of July one landed in the Mauritius from China. There was no other change in the composition of the Force during the year.

The average strength of the troops was 1,781, the admissions into hospital were 1,350, and the deaths 25, including three among invalids on their passage to England. These numbers give the proportion of 758 admissions and 14·01 deaths per 1,000 of mean strength.

The following Table shows the amount of sickness and mortality in each of the corps composing the garrison :—

	Average Annual Strength	Admissions into Hospital.	Deaths.				Ratio per 1,000.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Royal Artillery	217	260	2	..	..	2	1,198	9·22
Royal Engineers ..	124	168	4	..	..	4	1,355	32·26
2nd Batt., 13th Regiment	702	518	6	1	3	10	738	14·24
„ 22nd „ ..	724	400	6	2	..	8	553	11·05

The other death was that of a Barrack Sergeant.

The Royal Engineers had the highest proportion of both admissions and deaths, a result probably in some degree due to the previous service of one of the companies in China.

The following Table, framed from Abstract No. XX. of Appendix, shows the influence of the different classes of diseases in producing the sickness and mortality :—

Order.	Diseases.	Strength 1,781. Admitted.	Deaths. At Mauritius.	Deaths. Of Invalids.	Deaths. Total.	1866. Ratio per 1,000. Admitted.	1866. Ratio per 1,000. Died.	1859-65. Ratio per 1,000 Admitted.	1859-65. Ratio per 1,000 Died.
	Class I.								
1	Miasmatic Diseases ..	515	10	1	11	289·2	6·17	300·7	10·97
2	Enthetic „ ..	308	..	..	..	172·9	..	113·5	..
3	Dietic „ ..	68	..	..	..	38·2	..	17·2	·16
4	Parasitic „ ..	4	..	..	..	2·2	..	7·3	..
	Class II.								
1	Diathetic Diseases ..	1	..	..	..	·6	..	2·7	..
2	Tubercular „ ..	9	2	1	3	5·0	1·68	10·7	2·19
	Class III. Diseases of the—								
1	Nervous System ..	22	1	..	1	12·4	·56	21·1	1·18
2	Circulatory „ ..	12	1	..	1	6·7	·56	10·1	·55
3	Respiratory „ ..	74	..	1	1	41·5	·56	49·7	·70
4	Digestive „ ..	92	6	..	6	51·7	3·36	74·5	1·10
5	Urinary „ ..	1	..	..	..	·6	..	2·8	·08
6	Reproductive „ ..	12	..	..	..	6·7	..	13·2	..
7	Locomotive „ ..	4	..	..	..	2·2	..	5·6	..
8	Integumentary „ ..	101	..	..	..	56·7	..	109·2	·08
	Class IV.								
4	Diseases of Nutrition	3	..	..	..	1·7	..	8·2	·08
	Class V.								
1	Accidents	118	2	..	2	66·3	1·12	68·0	·94
4	Suicide	..	..	..	..	..	..	·4	·78
6	Corporal Punishment	6	..	..	..	3·4	..	3·0	..
	No appreciable disease	..	..	..	..	..	..	·4	..
	Diseases not specified	..	..	..	..	..	..	4·4	..
	Total ..	1,350	22	3	25	758·0	14·01	822·7	18·81

The admissions and deaths have been considerably under the average of the seven preceding years. Compared, however, with the results for 1865, the admissions have been nearly identical in the two years, but the deaths in 1866 have been nearly double.

MIASMATIC DISEASES have been a little below the average. When subdivided they give the following results :—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength. 1866. Admitted.	1866. Died.	1859-65. Admitted.	1859-65. Died.
Eruptive Fevers	1	..	·6	..	·3	..
Paroxysmal „	37	..	20·8	..	12·9	·39
Continued „	147	6	82·5	3·36	61·2	1·57
Dysentery and Diarrhœa ..	165	4	92·6	2·25	138·7	3·29
Spasmodic Cholera	..	..	..	..	13·9	5.33
Sorethroat and Influenza ..	9	..	5·0	..	8·9	..
Ophthalmia	93	..	52·2	..	29·9	..
Rheumatism	46	..	25·8	..	26·5	..

Mauritius. *Paroxysmal Fevers* were above the average, but none of the cases terminated fatally. Upwards of half the admissions were from the Royal Artillery.

Continued Fevers were also above the average, and the Artillery furnished the largest number of cases. Of the Infantry Regiments the 13th, which was quartered during the latter half of the year in Port Louis, had nearly twice as many cases as the 22nd, which occupied Mahebourg and the outposts. All the deaths by fever occurred in Port Louis.

Dysentery and Diarrhœa were below the average and were less prevalent also than in 1865, and no cases of *Spasmodic Cholera* occurred during the year.

Ophthalmia was much above the average, but the excess occurred in the 2nd Battalion 22nd Regiment, which had suffered considerably from this disease in Malta in 1864. The surgeon of the corps states in his report that "at the present time the disease has been nearly eradicated from the Regiment."

ENTHETIC DISEASES show a considerable increase upon the amount in 1865, chiefly in cases of syphilis. The 13th Regiment furnished the largest proportion, upwards of half the cases of syphilis having occurred in it.

DISEASES OF THE DIGESTIVE SYSTEM have been considerably lower than formerly, the difference being chiefly in dyspepsia and inflammation of the liver. There has also been a satisfactory reduction in the DISEASES OF THE INTEGUMENTARY SYSTEM, particularly boils (*phlegmon*) and ulcers.

SANITARY REPORT.

The reader is referred to the Appendix* for a full and very interesting description of the epidemic of fever prevailing at this station throughout the year 1867.

It is only necessary in this place to remark that miasmatic diseases were not unusually frequent during 1866, and the number of fever cases of all types gave but little intimation of that malarial form of fever which was to prevail so extensively, and with such disastrous results, very soon afterwards.

Dr. Reid, the Principal Medical Officer, directs attention to the amount of intemperance as a source of disease among the troops. He considers it a great desideratum to have a small hospital for slighter ailments and for accidents, in Fort George, to obviate the necessity of the men being marched or conveyed 1¼ miles to the Regimental Hospital, Port Louis, often during the heat of the day; and to have an hospital for all serious or protracted cases on an elevated site in Plaines Wilhems, near the line of railway. The gain—the speedy return to duty—the saving of life, and of charges for invaliding, rendered necessary by the attempt to get the sick and hurt effective, in an hospital of which the sanitary state and position are much more objectionable than those of the barrack occupied in health—would, in the end, cover all the charges of such a sanitarium, the need of which has been manifest and represented for many years past, and the absolute want of which has been keenly felt of late.

Connected therewith, sufficient barrack or hut accommodation for all the troops usually stationed in Port Louis is indispensable. The guard required for the military chest, public offices, &c., could be furnished from the citadel, and renewed (by railway) every month, or once a fortnight. Not more than 120 men need be kept at a time in Port Louis, and these might be lodged in the citadel or Fort George.

Until some such arrangement be carried into effect there will continue to be much waste of life, and a large amount of disease, non-effectiveness and invaliding among the troops. The deficiency of vegetables referred to by the Regimental Medical Officers—or, rather, their occasional deficiency and dearness—might be effectually made good by soldiers' gardens in the vicinity of the proposed new barracks; while the quality of the meat might be improved by the Commissariat having cattle in their own keeping in its vicinity.

* *Vide* page 442.

Increased means of ventilation and barrack accommodation, have been secured at Flacq, as also a system of charcoal filters at that port, as well as at Grand River, S.E. *Mauritius.*

A good deal is being effected during the present year (1867) to improve the sanitary condition and comfort of the soldier at Mahebourg; but these matters will be referred to in the sanitary report for next year.

It is a notable fact that ophthalmia almost entirely—indeed, as regards new cases, quite disappeared from the 22nd Regiment during its short residence on the island. The corps brought the disease from Malta, where it had been very prevalent among the men. In like manner, the 2nd Battalion 13th Regiment landed here in 1863, from the Cape, with some ophthalmic cases, which spread the disease extensively in the battalion, and occasioned permanent disability and invaliding to a great extent. It gradually, however, disappeared in the Mauritius, though less quickly than in the 22nd Regiment.

Section II.

On the Extent of Invaliding.

There were 54 invalids sent to England from the Mauritius during the year, and 31 finally discharged the service at Netley; being respectively in the ratio of 30·32 and 17·41 per 1,000 of mean strength.

The following Table shows the classes of disabilities for which the men were invalided and discharged. The details are given in Abstract No. XXI. of Appendix.

Disabilities.	Invalids sent Home.	Discharged the Service at Netley.
Dysentery and Diarrhœa	13	3
Ophthalmia	9	5
Continued Fevers	1	..
Rheumatism	1	2
Venereal Diseases	3	2
Tubercular „	5	2
Diseases of the—		
Nervous System	5	2
Circulatory „	3	2
Respiratory „	5	1
Digestive „	4	5
Urinary „	..	2
Locomotive „	..	1
Diseases of Nutrition..	1	2
Accidents and Violence	4	2
Total	54	31
Ratio per 1,000 of Mean Strength .. .. { 1866 ..	30·32	17·41
{ 1860-65 ..	37·92	16·71

The proportion invalided has been under the average of the seven preceding years, and considerably lower than in 1865. Three-fifths of the number sent home were men of the 2nd Battalion 13th Regiment, and included all the cases of dysentery.

Section III.

Mean Daily Sick.

Mauritius. The average number constantly non-effective from sickness during the year was 77, or in the ratio of 43·2 per 1,000 of the strength. From this number the following results have been calculated.—

	1866.	1859–65.
Ratio per 1,000 of Strength constantly Sick	43·23	37·46
	Days.	Days.
Mean Sick-Time to each Soldier	15·78	13·67
Average duration of cases of Disease	20·82	16·62

In all these particulars the ratios have been above the average of the preceding seven years, and have been also higher than in 1865.

Section IV.

Influence of Age on the Mortality.

The following Table, framed from Abstract No. XXIII. of Appendix, shows the influence of age on the mortality of the troops in the Mauritius in quinquennial periods of life.

	Under 20.	20 and under 25.	25 and under 30.	30 and under 35.	35 and under 40.	40 and upwards.
Ratio of Deaths per 1,000 of Strength:						
1866	..	3·98	16·82	5·98	9·35	..
1859–65	9·67	16·57	16·29	28·88	33·90	33·33

IX.—ON THE HEALTH OF THE TROOPS SERVING IN THE ISLAND OF CEYLON.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

1.—WHITE TROOPS.

Ceylon.

DURING the year the Force consisted of the 6th Battery 2nd Brigade Royal Artillery and the 2nd Battalion 25th Regiment. The average strength was 886, the admissions into hospital were 1,177, and the deaths 19, being in the ratio of 1,328 and 21·44 per 1,000 of mean strength. Of the deaths three occurred out of hospital and one among the invalids. Both sickness and mortality were considerably under the proportion in 1865.

The influence of the different classes of diseases in producing sickness and mortality is shown in the following Table. The details for 1866 are given in Abstract No. XX. of Appendix.

Orders.	White Troops .. Diseases.	Strength, 886. Admitted.	Died. At Ceylon.	Died. Of Invalids.	Died. Total	Annual Ratio per 1,000. 1866. Admitted.	1866. Died.	1859–65. Admitted.	1859–65. Died.
	Class I.								
1	Miasmatic Diseases	495	3	1	4	558·7	4·51	617·1	12·45
2	Enthetic „ ..	123	..	..	..	138·8	..	214·1	·16
3	Dietic „ ..	42	..	..	..	47·4	..	33·9	·32
4	Parasitic „ ..	2	..	..	..	2·3	..	5·8	..
	Class II.								
1	Diathetic Diseases ..	9	..	..	..	10·2	..	6·5	·16
2	Tubercular „ ..	16	1	..	1	18·1	1·13	16·8	3·52
	Class III. Diseases of the—								
1	Nervous System..	46	4	..	4	51·9	4·51	49·2	2·40
2	Circulatory „ ..	19	1	..	1	21·4	1·13	19·8	1·11
3	Respiratory „ ..	53	..	..	..	59·8	..	90·7	1·43
4	Digestive „ ..	73	5	..	5	82·4	5·64	153·6	2·87
5	Urinary „ ..	3	..	..	..	3·4	..	5·4	·16
6	Reproductive „ ..	19	..	..	..	21·4	..	16·6	..
7	Locomotive „ ..	..	..	..	..	..	..	4·6	·16
8	Integumentary „ ..	166	..	..	..	187·4	..	167·7	..
	Class IV.								
4	Diseases of Nutrition	8	1	..	1	9·0	1·13	8·1	..
	Class V.								
1	Accidents	101	3	..	3	114·0	3·39	138·9	1·28
4	Suicide	..	..	..	..	..	..	..	·48
6	Corporal Punishment	2	..	..	..	2·3	..	3·8	..
	Diseases not specified	..	..	..	..	..	..	4·3	..
	No appreciable disease	..	..	..	..	..	..	·2	..
	Total	1,177	18	1	19	1328·5	21·44	1557·1	26·50

Ceylon. MIASMATIC DISEASES were less prevalent and much less fatal than on the average of the seven preceding years. When sub-divided they furnish the following ratios:—

Diseases.	Admitted	Died.	Ratio per 1,000 of Mean Strength.			
			1866.		1859–65.	
			Admitted	Died.	Admitted	Died.
Eruptive Fevers	..	..	..	..	·8	·16
Paroxysmal „	116	3	130·9	3·39	115·1	·64
Continued „	125	..	141·1	..	74·7	1·28
Dysentery and Diarrhœa ..	171	..	193·0	..	232·5	7·18
Spasmodic Cholera	..	..	..	..	5·6	2·71
Sorethroat and Influenza ..	8	..	9·0	..	17·2	..
Ophthalmia	42	..	47·4	..	95·3	..
Rheumatism	16	..	18·1	..	67·7	·16

Paroxysmal and Continued Fevers, but particularly the latter, were more prevalent than usual. No special reason for this has been assigned. The excess in cases of continued fever was chiefly at Colombo, in April, May, and June, in the 25th Regiment; the men of the Royal Artillery at the same station were exempt from it.

Dysentery and Diarrhœa were below the average, and although spasmodic cholera was epidemic among the civil population no cases occurred among the white troops. The admissions for *Ophthalmia* amounted to only half the average proportion.

ENTHETIC DISEASES were considerably under the average and were lower than in 1865. The reduction took place chiefly in cases of syphilis.

DIETIC DISEASES were above the average, though much below the proportion in 1865. With one exception all the admissions were from intemperance (*ebriositas*).

DISEASES OF THE RESPIRATORY AND DIGESTIVE SYSTEMS show a great reduction in the admissions—the former in cases of bronchitis, and the latter in those of dyspepsia and acute hepatitis.

2.—BLACK TROOPS.

In May this Force was reduced by the embarkation of four companies of the Ceylon Rifle Regiment for service at Hong Kong. The average strength of the Gun Lascars and Ceylon Rifles, serving in Ceylon, was 1,207; the admissions into hospital were 1,366 and the deaths 17, being in the ratio of 1,132 and 14·09 per 1,000 of mean strength, both considerably higher than in 1865.

The following Table shows the admissions and deaths by the different classes of diseases. The details for 1866 are given in Abstract No. XX. of Appendix.

Orders.	Black Troops	Strength 1,207.		Annual Ratio per 1,000 of Mean Strength.			
				1866.		1859-65.	
	Diseases.	Admitted	Died.	Admitted	Died.	Admitted	Died.
	Class I.						
1	Miasmatic Diseases ..	885	13	733·2	10·77	648·1	8·57
2	Enthetic „ ..	15	..	12·4	..	26·8	..
3	Dietic „ ..	1	..	·8	..	1·1	..
4	Parasitic „ ..	26	..	21·5	..	58·9	..
	Class II.						
1	Diathetic Diseases ..	9	1	7·5	·83	5·9	·49
2	Tubercular „ ..	4	2	3·3	1·66	2·9	1·26
	Class III. Diseases of the—						
1	Nervous System ..	13	1	10·8	·83	12·1	·88
2	Circulatory „ ..	1	..	·8	..	1·5	·88
3	Respiratory „ ..	69	..	57·2	..	48·5	·88
4	Digestive „ ..	64	..	53·0	..	40·0	·78
5	Urinary „ ..	2	..	1·7	..	·3	..
6	Reproductive „ ..	5	..	4·2	..	8·2	..
7	Locomotive „ ..	4	..	3·3	..	1·0	..
8	Integumentary „ ..	157	..	130·1	..	129·3	..
	Class IV.						
4	Diseases of Nutrition ..	1	..	·8	..	1·4	·19
	Class V.						
1	Accidents	107	..	88·6	..	76·3	·39
4	Suicide	..	..	..	..	·1	·29
6	Corporal Punishment ..	3	..	2·5	..	·7	..
	Diseases not specified ..	..	..	..	..	·9	..
	Total	1,366	17	1131·7	14·09	1064·0	14·61

The admissions have been above and the deaths a trifle under the average of the seven preceding years. The excess in the admissions has been in miasmatic diseases, and the deaths by that class have also been above the average. The reduction in the ratio of mortality has taken place in diseases of the circulatory, respiratory, and digestive systems, and in accidents and violence.

Miasmatic Diseases, when sub-divided, give the following results:—

Diseases.	Admitted	Died.	Ratio per 1,000 of Mean Strength.			
			1866.		1859-65.	
			Admitted	Died.	Admitted	Died.
Eruptive Fevers	14	..	11·6	..	8·9	·10
Paroxysmal „	505	1	418·4	·83	399·5	1·56
Continued „	3	..	2·5	..	36·2	·29
Dysentery and Diarrhœa ..	121	7	100·1	5·80	60·9	2·23
Spasmodic Cholera	9	5	7·6	4·14	8·8	4·37
Sorethroat and Influenza ..	1	..	·8	..	2·6	..
Ophthalmia	107	..	88·6	..	65·7	..
Rheumatism	90	..	74·6	..	49·0	..

Eruptive Fevers, although rather above the average in frequency, were not the cause of any deaths. There were no cases of small-pox; 11 of the admissions were from measles and three from chicken-pox.

Ceylon. *Paroxysmal Fevers* were above the average, but those of the *continued* type much under it. Trincomalee and Kornegalle furnished a very high proportion of cases of paroxysmal fevers; at the former 182 admissions occurred in a strength of 192, and at the latter 25 in a strength of 28 men.

Dysentery and Diarrhœa were also considerably above the average, and the mortality by them was more than doubled. One half of the cases of diarrhœa occurred in November and December, when cholera prevailed as an epidemic among the civil population.

Spasmodic Cholera was epidemic at Kandy in July and August, and again in November and December, at Jaffna in September, at Hambantotte in November, and at Colombo in November and December; but, although the disease was stated to be severe among the native population, it affected the troops to a very slight extent. Four cases and two deaths occurred at Colombo, three and one death at Kandy, one fatal case at Jaffna, and one, also fatal, at Hambantotte.

The admissions from ophthalmia and rheumatism have been considerably above the average, but no cause has been assigned by the medical officers for this increase.

Enthetic Diseases continue to furnish a very low ratio of admissions.

Diseases of the Digestive System, though above the previous average, were less frequent than in 1865. Thirty were cases of colic, being scarcely half the number which occurred in that year; no explanation has been given of the frequency of this disease among the black, while it rarely occurs among the white troops.

SANITARY REPORT.

Dr. Frazer, Deputy-Inspector General of Hospitals, in his sanitary report for 1866, remarks:—

As to the causes which have affected the health of the troops, the observations made by the medical officers in their several sanitary reports of stations are very much in accordance with the results of my annual inspections.

I have submitted in detail to the Major-General Commanding the hygienic defects of all the stations in the Command, and offered such suggestions as appeared to me calculated to improve the health of the troops, and they are so multifarious, embracing barracks and hospitals, their sites, accommodation, lighting, and ventilation, drainage, mode of sewerage, rations, and cooking, ablution and water supply, at Colombo, Kandy,* Galle, Trincomalee, and Newera Ellia, that it is impossible to repeat them in this limited space.

Notwithstanding the generally defective sanitary condition of all the stations, it is gratifying to state that the health of the European force has been more satisfactory than it has been since 1859.

With the exception of 12 new additional married quarters at Colombo, and the renting of some houses as married quarters at Galle, no improvements have taken place in respect of increased cubic accommodation in barracks and hospitals, in the ventilation of hospitals, barrack-rooms, huts, and water supply. The only ablution improvement has been the more systematic use of the principal ablution-house in the fort, Colombo. One barrack has no ablution-room; three companies at Colombo have had the benefit of using Duff's cooking range for baking and boiling.

The soldiers' diet is still defective in the vegetable element, and until it forms a part of his ration will continue so, from the difficulty of procuring good vegetables.

The clothing of the troops is suited to the climate.

No improvement has been made in the drainage of barracks or hospitals, and the condition of their vicinity in this respect is, in most instances, very bad. The dry-earth sewage has been successfully tried at Newera Ellia,† but only partially and imperfectly carried out in the Colombo hospital. A dry-earth latrine for the new married quarters will come into operation as soon as a contract can be effected.

* *Vide* Report on Well-water, Appendix, page 325.

† See Report, Appendix, page 496.

Section II.

On the Extent of Invaliding.

During the year 43 invalids were sent to England and 20 were finally discharged the service at Netley, and 17 of the black troops were discharged as invalids in Ceylon. These numbers give the respective ratios of 48·53, 22·57, and 14·08 per 1,000 of mean strength. *Ceylon.*

The following Table, framed from Abstract No. XXI. of Appendix, shows the classes of disabilities for which the men were invalided and discharged :—

	White Troops.		Black Troops.
	Invalids sent to England.	Invalids Discharged at Netley.	Discharged as Invalids in Ceylon.
Dysentery and Diarrhœa	12	..	1
Paroxysmal Fevers	2	..	1
Ophthalmia	1	1	..
Rheumatism	1	..	4
Venereal Diseases	2	..	..
Diathetic „	1	..	1
Tubercular „	5	3	..
Diseases of the—			
Nervous System	5	3	2
Circulatory „	3	3	1
Respiratory „	4	2	3
Digestive „	5	6	1
Reproductive „	..	1	..
Locomotive „	..	1	..
Integumentary „	..	..	1
Diseases of Nutrition	1	..	2
Accidents and Violence	1	..	..
Total. ..	43	20	17
Ratio per 1,000 of Strength { 1866	48·53	22·57	14·08
Ratio per 1,000 of Strength { 1860-65	59·06	24·49	13·64

The invaliding of the white troops has been under the average of the six preceding years. Dysentery and diarrhœa were the diseases for which the greatest number of men were sent to England, and inflammation of the liver was the disability for which the greatest number were discharged at Netley.

Section III.

Mean Daily Sick.

The mean daily sick of the white troops during the year amounted to 52, and of the black troops to 49, being respectively 58·69 and 40·60 per 1,000 of the strength. The following Table gives the usual information on this head :—

	White Troops.		Black Troops.	
	1866.	1859–65.	1866.	1859–65.
Ratio per 1,000 of Strength constantly sick..	58·69	73·93	40·60	33·25
	days.	days.	days.	days.
Average sick time to each Soldier	21·42	26·98	14·82	12·13
Average duration of cases of Sickness ..	16·13	17·33	13·09	11·43

Ceylon. These ratios show a reduction in the mean daily sick, mean sick time to each soldier, and average duration of cases among the white troops, but an increase in all these particulars among the black troops.

Section IV.

Influence of Age on the Mortality.

The ages of the white troops serving in Ceylon in 1866, and the deaths at each age, are shown in Abstract No. XXIV. of Appendix, from which the following ratios have been calculated :—

Ages	Under 20.	20 and under 25.	25 and under 30.	30 and under 35.	35 and under 40.	40 and upwards.
White Troops.						
Ratio per 1,000 of Strength { 1866		12·71	44·94	17·24	71·43	..
Ratio per 1,000 of Strength { 1860-65	10·83	16·70	27·84	38·46	56·18	166·7

The small numbers render the results liable to great fluctuations, but the average of the six years shows a very marked increase of mortality with the advance of age.

The return of ages of the Ceylon Rifle Regiment, for 1866, is not available.

X.—ON THE HEALTH OF THE TROOPS IN THE AUSTRALASIAN COLONIES.

Section I.
Sickness and Mortality.

I. Australia and Tasmania.

STATISTICAL REPORT.

Australia.

In October the Head-Quarters and Right Wing of the 50th, and in November the Head-Quarters of the 2nd Battalion 14th Regiment arrived in Australia from New Zealand, and in October the detachment of the 1st Battalion 12th Regiment embarked for New Zealand.

The average strength of the troops in Australia during the year was 547; the admissions into hospital were 408, and the deaths five, of which one occurred among the invalids sent to England. These numbers give the proportion of 746 admissions and 9·13 deaths per 1,000 of mean strength.

The following Table shows the influence of the different classes of diseases in causing sickness and mortality. The details for 1866 are stated in Abstract No. XXV. of Appendix.

Average Strength .. 547		Australia and Tasmania.							
		1866.						1859–65.	
			Died.			Ratio per 1,000.		Ratio per 1,000.	
Orders.	Classes of Diseases.	Admitted.	In the Colony.	Of Invalids.	Total Deaths.	Admitted.	Died.	Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	91	..	..	..	166·4	..	208·0	2·09
2	Enthetic „ ..	78	..	..	..	142·6	..	111·4	..
3	Dietic „ ..	23	..	..	..	42·0	..	25·5	·16
4	Parasitic „ ..	2	..	..	..	3·7	..	3·0	..
	Class II.								
1	Diathetic Diseases ..	7	..	..	..	12·8	..	8·2	·32
2	Tubercular „ ..	5	2	1	3	9·1	5·48	16·2	5·29
	Class III.								
	Diseases of the—								
1	Nervous System	11	..	..	..	20·1	..	29·6	1·76
2	Circulatory „	7	2	..	2	12·8	3·65	13·0	2·09
3	Respiratory „	41	..	..	..	75·0	..	49·2	·96
4	Digestive „	29	..	..	..	53·0	..	47·3	·48
5	Urinary „	2	..	..	..	3·7	..	4·0	·64
6	Reproductive „	5	..	..	..	9.1	..	2·1	..
7	Locomotive „	..	..	..	..	..	..	2·9	..
8	Integumentary „	31	..	..	..	56·7	..	67·2	..
	Class V.								
1	Accidents	76	..	..	..	138·9		102·7	1·28
4	Suicide	..	..	..	..	..	..	..	·32
6	Corporal Punishment	..	..	..	..	..	..	2·2	..
	Diseases not specified	..	..	..	..	..	..	10·6	·16
	No appreciable Disease	..	..	..	..	..	..	·8	..
	Total	408	4	1	5	745·9	9·13	703·9	15·55

Australia. The admissions have been slightly above and the deaths considerably under the average of the preceding seven years. The increase in the admissions has taken place chiefly in venereal and dietic diseases, in those of the respiratory system and in accidents; but the Force was so small and the changes in it so great that little importance can be attached to these variations.

MIASMATIC DISEASES, when sub-divided, give the following results:—

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 of Strength			
			1866.		1860–65.	
			Admitted.	Died.	Admitted.	Died.
Eruptive Fevers	1	..	1·8	..	1·1	..
Paroxysmal „	4	..	7·3	..	4·3	·16
Continued „	2	..	3·7	..	22·6	1·28
Dysentery, Diarrhœa, and Cholera	18	..	32·9	..	40·1	·48
Sorethroat and Influenza ..	6	..	11·0	..	43·3	·16
Ophthalmia	37	..	67·6	..	40·6	..
Rheumatism	17	..	31·1	..	45·0	..

The only disease which shows a marked excess over the average is ophthalmia. But the increase was due to 30 cases having occurred in the 2nd Battalion 14th Regiment after its return from New Zealand, and chiefly among men who had suffered from the disease while serving in that Colony.

ENTHETIC DISEASES were considerably above the average; about one-third of the cases were of the syphilitic and two-thirds of the gonorrhœal group.

DIETIC DISEASES were considerably above the average. All the cases were recorded under the head of intemperance (*ebriositas*). Two-thirds of the cases occurred among the troops serving throughout the year in Australia, and one-third only among those which arrived during the year from New Zealand, the mean strength of the two classes being nearly alike.

SANITARY REPORT.

Surgeon-Major Carte, M.B., C.B., in his Report for 1866, makes the following observations:—

The several sanitary reports from Melbourne and the out-stations state that the troops are generally healthy. Although measles and scarlatina have been epidemic amongst the children, but one case is recorded among the adults. These diseases were very prevalent in Melbourne and its suburbs. The barracks at the out-stations are reported to be built upon healthy sites, well ventilated and lighted; but at Melbourne this is not so. The barracks are there built on the verge of a swamp, and so low as not to admit of proper drainage. A good deal has been done to improve the sanitary condition; old drains were cleared, and foul pools filled in, by recommendation of the Monthly Sanitary Committee. The hospital is inadequate; there is no exercise ground for convalescents other than the barrack square.

The dry-earth conservancy system has been adopted in place of latrines with much benefit, as there is less soil now passing out to the swamp, it being conveyed away by carts, at night, from the barracks. This system is also in use at Sydney, where the accommodation is scarcely sufficient. Latrines are in use at the other stations; but Dr. Carte has no doubt, when the superiority of the earth system is established, these closets will become universal.

No material change has taken place in the clothing, cooking, and rations. During the summer "hot winds" prevail, and it would be very desirable if the clothing were altered to light serge, by regulation.

The number of sick has been largely increased by admissions to hospital for venereal in all its forms. The expediency of obtaining some legislative

enactment similar to that of the "Contagious Diseases Prevention Act," now in force in garrison towns in Great Britain, would be no less a benefit to the soldier than to the public. The Principal Medical Officer announces his intention of bringing this matter before the Brigadier-General, with the view of moving the Colonial Government to enact some similar law. *Australia.*

The regimental canteen system has been established at Melbourne, Sydney, and Adelaide, with great benefit. Liquors and articles reported of good quality.

II. New Zealand.

STATISTICAL REPORT. *New Zealand.*

The Force serving in New Zealand underwent great reductions during the year. In January the 70th, in March the 68th, in March and April the 43rd, in May and June the 40th Regiments embarked for England; in June a battery of the 4th Brigade Royal Artillery and a company of Royal Engineers, and in November another battery of the same Brigade left the Colony for England. In September and October the head quarters and right wing of the 50th, and in November the 2nd Battalion 14th Regiment were transferred to Australia and Tasmania, and the detachment of the 2nd Battalion 12th Regiment joined the head-quarters in New Zealand from Australia.

The average strength of the troops during the year was 5,598; the admissions into hospital were 2,508 and the deaths 72, of which 22 occurred out of hospital, and 8 among the invalids on their passage to England and at Netley. The ratio of admissions was 448, and of deaths 12·86 per 1,000 of the mean strength, both lower than in 1865.

The following Table shows the relative sickness and mortality of the different corps composing the Force:—

Corps.	Average Annual Strength.	Admissions into Hospital.	Deaths.				Ratio per 1,000.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted	Died.
Royal Artillery.. ..	258	132	2	1	4	7	512	27·13
,, Engineers ..	72	32	..	..	..	..	465	..
Military Train, 4th Batt.	278	153	2	1	..	3	550	10·79
1st Batt. 12th Regiment	664	286	6	3	1	10	431	15·06
2nd Batt. 14th ,,	781	416	4	4	1	9	533	11·52
2nd Batt. 18th ,,	880	444	5	1	1	7	504	7·95
40th Regiment.. ..	330	117	..	..	..	..	354	..
43rd ,, ...	209	107	4	..	..	4	512	19·13
50th ,, ...	743	349	3	2	1	6	470	8·07
57th ,, ...	812	337	7	10	..	17	415	20·93
68th ,, ...	179	71	2	..	..	2	397	11·17
Various Staff Corps ..	199	53	4	1	..	5	266	25·13

The following Table shows the admissions into hospital, and deaths by the different classes of diseases. The details for 1866 are stated in Abstract No. XXV. of Appendix.

New Zealand.

Orders.	Diseases.	Admissions.	Deaths. In New Zealand.	Deaths. Of Invalids.	Deaths. Total.	Ratio per 1,000 of Mean Strength. 1866. Admitted.	1866. Died.	1859–65. Admitted.	1859–65. Died.
	Average Strength ..	5,598.							
	Class I.								
1	Miasmatic Diseases ..	809	5	3	8	144·5	1·43	216·0	2·24
2	Enthetic „ ..	133	2	..	2	23·8	·36	25·5	..
3	Dietic „ ..	69	1	..	1	12·3	·18	11·7	·37
4	Parasitic * „ ..	32	..	..	..	5·7	..	17·3	..
	Class II.								
1	Diathetic Diseases ..	14	..	..	..	2·5	..	5·5	·13
2	Tubercular „ ..	45	2	..	2	8·0	·36	8·7	1·90
	Class III. Diseases of the—								
1	Nervous System ..	69	6	1	7	12·3	1·25	20·2	·76
2	Circulatory „ ..	35	18	3	21	6·3	3·75	8·2	1·42
3	Respiratory „ ..	262	4	..	4	46·8	·71	51·7	·84
4	Digestive „ ..	164	2	..	2	29·3	·36	33·1	·82
5	Urinary „ ..	9	..	1	1	1·6	·18	2·3	·26
6	Reproductive „ ..	34	..	..	..	6·1	..	5·4	..
7	Locomotive „ ..	16	..	..	..	2·9	..	3·7	..
8	Integumentary „ ..	293	1	..	1	52·3	·18	73·3	·10
	Class IV.								
4	Diseases of Nutrition ..	..	..	..	..	..	..	·9	..
	Class V.								
1	Accidents	444	9	..	9	79·3	1·60	89·2	2·55
2	In Battle..	24	14	..	14	4·3	2·50	14·5	5·66
3	Homicide	..	..	..	..	..	..	·2	·08
4	Suicide	1	..	..	..	·2	..	·1	·05
5	Execution	..	..	..	..	..	..	..	·03
6	Corporal Punishment ..	55	..	..	..	9·8	..	17·1	..
	Diseases not specified ..	..	..	..	..	..	..	1·9	·05
	Total	2,508	64	8	72	448·0	12·86	606·5	17·26

The proportion both of admissions and deaths has been considerably under the average of the preceding seven years. The reduction in the former has been most marked in miasmatic diseases; in the latter it has been in accidental deaths and those by the enemy.

MIASMATIC DISEASES were less prevalent than in 1865. When sub-divided they give the following results:—

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 of Strength. 1866. Admitted.	1866. Died.	1859–65. Admitted.	1859–65. Died.
Eruptive Fevers	..	..	..	..	·1	·03
Paroxysmal ,, ...	5	..	·9	..	4·6	·05
Continued ,, ...	145	4	25·9	·71	33·5	1·11
Dysentery, Diarrhœa, and Cholera	157	1	28·0	·18	59·7	·97
Sorethroat and Influenza ..	129	..	23·0	..	25·6	..
Ophthalmia	264	..	47·2	..	47·9	..
Rheumatism	81	..	14·5	..	33·4	..

There has been a reduction in all the diseases in this class, except Ophthalmia, which amounted to exactly the average. The reduction has been most marked in continued fevers and rheumatism, and may, perhaps, have been due to the altered condition of the troops with regard to field service and barrack accommodation, consequent on the cessation of hostilities and the reduction of the Force. The 2nd Battalion 14th and the 50th Regiments furnished much the highest proportion of cases of ophthalmia; more than half the admissions by it in the Command occurred in these two corps.

Diseases of the Circulatory System. The mortality by this class was more than double the average of the preceding seven years. Two of the deaths were from disease of the valves of the heart and eight from aneurism. The medical officer attributed these diseases to the accidents from which the men suffered and the severe exertion made by them on field service, and particularly to the long marches and to the great weights they were obliged to carry.

Accidental and Violent Deaths.—Drowning holds, as usual, a prominent place among the causes of the accidental deaths, having occasioned six out of the nine deaths under the first order of this class. Of the 14 deaths in the second order eight were of men killed in action, and six of men who died subsequently in hospital of their wounds; four of these were in the 14th, one in the 50th, and nine in the 57th Regiments. The seat of the wounds of those killed in action was in one the head, in four the chest, and in three the abdomen; in those who died subsequently in hospital it was in two the chest, in one the abdomen, in one the spine, in one the thigh with fracture of the bone and laceration of the femoral artery, and in one the knee joint with extensive comminution of the bones.

SANITARY REPORT.

Deputy Inspector-General Dr. Gibb, in reporting on the health of the troops serving in New Zealand during 1866, has to make a satisfactory report, a further diminution, relatively to strength, having taken place in the admissions for disease and the rate of mortality compared with the two last years. The total mortality from zymotic disease was only seven, which shows an improvement in health, especially when we consider that the greater portion of the force were in the field, distributed in outposts established in the recently confiscated territories, and that a moveable column was engaged in active service. Medical Officers in charge of regiments and stations report favourably of the salubrious and genial character of the climate, which I am able to corroborate, having inspected the posts in the several districts of the island, which differ somewhat in this respect. These officers were satisfied with the sanitary

New Zealand. arrangements, as only two recommendations of an important nature are made by them, viz.: 1st. The construction of huts for the men now living in tents within several redoubts in the Wanganui and Taranaki districts. These, situated on high cliffs overhanging the sea, are much exposed to storms of wind and heavy rains, and have thus induced, during the winter, bronchial complaints among the men. The attention of the military authorities has been drawn to this matter, and these posts will be soon abandoned. 2nd. The defective system of the latrines, and want of ablution-rooms in the barracks at Auckland. The former defect requires to be remedied, and has been frequently reported, and if this garrison is to be much longer occupied by troops, the latrines must be reconstructed, or replaced by others on another method.

The absence of low fever this year in the Waikato District may be ascribed to the sanitary measures specially recommended last year, and carried out diligently by the Medical Officers.

It is noticeable that the greatest mortality this year was from diseases of the heart and aneurism, amounting to 17, which is 26·5 per cent. of the deaths in the Command. This often occurs after a harassing war of some duration, from severe exertions made during the hot weather and marches.

The Medical Officers state that the men were well fed, clothed, and properly cared for in other respects. Vegetables were at times scarce, and sometimes not to be procured, but this was very temporary. No case of scurvy appeared, nor did any of the diseases indicate a scorbutic taint.

In the districts of Wanganui and Taranaki, during January and February, the head-quarters field force, organized as a moveable column for a special service, was engaged in attacking several pahs of the enemy in the recesses of dense forests. Acting as Principal Medical Officer to this expedition, which was most trying and harassing, in the middle of the hot season, I had an opportunity of observing the excellent health enjoyed by the troops while undergoing some hardships, and making marches unprecedented before in this colony. Not a single casualty occurred from disease during the whole period.*

This remarkable exemption may be ascribed, not only to the salubrious climate, but to the military arrangements, constant movement, early morning marches, and the high spirit of the men, excited by confidence and success.

The Sanitary Officer serving in this Command for a portion of this year recommended a few sanitary details. As the remainder of the force is now being rapidly withdrawn, and it is uncertain whether even a single regiment will be retained, it is not in my power to make sanitary suggestions for particular stations. I would, however, recommend, as the general requirements of the Command, viz.:—

1st. That the present cesspit system of latrines in barracks be abolished, and the "dry earth" method substituted.

2nd. The erection of baths and ablution-rooms, especially the former, to enforce the personal cleanliness of the soldier, with a view to health.

3rd. A systematic encouragement of soldiers' gardens, and the institution of workshops, nowhere more wanted than in this colony, for obvious reasons.

Section II.

On the Extent of Invaliding.

Australasia. In 1866 there were 86 men sent home from Australia and New Zealand, and there were six finally discharged the service as invalids in the colony, and 152 at Netley, being respectively in the proportion of 13·99, 0·98, and 24·74 per 1,000 of mean strength. The following Table shows the classes of disabilities for which the men were invalided. The details will be found in Abstract No. XXVI. of Appendix.

* *Vide* Appendix, page 558.

Mean Annual Strength, 6,145. Classes of Disabilities.		Invalids sent to England from Australasia.	Invalids Discharged the Service. In Australasia.	Invalids Discharged the Service. In England.
Ophthalmia		9	..	13
Dysentery and Diarrhœa		3	..	2
Rheumatism		4	1	9
Venereal Diseases		2	..	6
Parasitic „		..	..	1
Diathetic „		2	..	..
Tubercular „		18	..	33
Diseases of the—				
Nervous System		11	..	18
Circulatory „		8	..	15
Respiratory „		5	2	3
Digestive „		8	2	7
Urinary „		2	..	5
Reproductive „		..	..	..
Locomotive „		1	..	3
Integumentary „		1	1	1
Diseases of Nutrition		1	..	3
Accidents and Violence		5	..	6
Wounds in Battle		6	..	27
Total		86	6	152
Ratio per 1,000 of Mean Strength	1866	13·99	·98	24·74
	1861–5	22·88	4·20	13·27

The number of invalids sent to England during the year was much below the average, but this was probably owing to the number of regiments ordered home, and which brought with them the men who would otherwise have been sent home as invalids. The number finally discharged at Netley was nearly twice the average; a large proportion of them consisted probably of men sent home in the preceding year. Tubercular diseases were the most common cause of discharge, and next to them the results of wounds received on service in the field.

Section III.

Mean Daily Sick.

The mean daily sick in Australia amounted to 16, and in New Zealand to 154, being respectively in the ratio of 29·25 and 27·51 per 1,000 of mean strength. The results in the following Table are calculated from these numbers:—

	Australia and Tasmania.		New Zealand.	
	1866.	1859–65.	1866.	1860–5.
Ratio per 1,000 constantly sick ..	29·25	33·67	27·51	35·56
	days.	days.	days.	days.
Average sick time to each soldier ..	10·68	12·29	10·04	12·98
Average duration of cases	14·31	17·54	22·41	21·43

Australasia. There has been a reduction in the average constantly non-effective from sickness, both in Australia and New Zealand, but particularly in the latter. The great changes which were taking place during the year in the composition of the Force may have had a considerable effect in producing this result.

Section IV.

On the Influence of Age on the Mortality.

The ages of the men in those corps which served throughout the year in Australasia, and the deaths at each quinquennial period of life are stated in Abstract No. XXVII. of Appendix. The results are shown in the following Table:—

		Under 20 Years.	20 and under 25.	25 and under 30.	30 and under 35.	35 and under 40.	40 and Upwards.
Ratio of deaths per 1,000 living ..	1866 ..	..	2·89	16·63	10·75	14·87	..
	1859–65	6·68	13·20	17·11	17·44	27·54	·47·96

XI.—ON THE HEALTH OF THE TROOPS SERVING IN CHINA AND JAPAN.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

I. China.

China. In April the 2nd Battalion 9th Regiment proceeded to Japan, relieving the 2nd Battalion 20th, which returned to Hong Kong. In the middle of May the 2nd Battalion 11th Regiment embarked for the Cape of Good Hope, and was replaced in China, in the beginning of June, by four companies of the Ceylon Rifles; and in the end of May the detachment of the 22nd Company of the Royal Engineers left for the Mauritius.

1. White Troops.

The average strength of the white troops in China during the year was 869, the admissions into hospital were 2,073, and the deaths 28, to which must be added 10 among invalids on their passage home and at Netley, making a total of 38. These numbers give the proportion of 2,385 admissions, and 43·72 deaths per 1,000 of mean strength, both considerably lower than in 1865.

The distribution of the admissions and deaths in the different corps was as follows:—

China.

Regiments.	Mean Annual Strength.	Admitted into Hospital.	Died.				Ratio per 1,000.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Royal Artillery	71	100	4	1	..	5	1,408	70·42
Royal Engineers..	17	31	2	..	..	2	1,824	117·65
2nd Battalion 9th Regiment ..	182	338	8	..	2	10	1,857	54·94
„ „ 11th „ ..	139	287	3	..	8	11	2,064	79·11
„ „ 20th „ ..	452	1,249	9	..	..	9	2,763	19·90

The other death was that of a private of the Army Hospital Corps.

The admissions into hospital in the 20th Regiment were greatly in excess of the proportion in the other corps, but it arrived at Hong Kong from Japan just at the commencement of the sickly season, when malarious fevers are extremely prevalent. The mortality in the 20th was greatly below that of the rest of the garrison.

The following Table shows the influence of the different classes of diseases in causing sickness and mortality among the white troops. The details for 1866 are stated in Abstract No.XXV. of Appendix.

Order.	Strength	869.				Annual Ratio per 1,000.			
	Diseases.	Admitted.	Died.			1866.		1859-65.	
			In China.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	1,422	14	7	21	1636·4	24·17	1200·0	41·18
2	Enthetic „ ..	245	..	..	..	281·9	..	330·4	·05
3	Dietic „ ..	29	..	1	1	33·3	1·15	37·9	·35
4	Parasitic „ ..	2	..	..	..	2·3	..	8·5	..
	Class II.								
1	Diathetic Diseases ..	2	1	1	2	2·3	2·30	5·7	·35
2	Tubercular „ ..	12	..	1	1	13·8	1·15	9·8	2·24
	Class III. Diseases of the—								
1	Nervous System ..	26	4	..	4	29·9	4·60	34·2	2·63
2	Circulatory „ ..	9	1	..	1	10·4	1·15	9·6	1·24
3	Respiratory „ ..	40	..	..	..	46·0	..	93·6	1·89
4	Digestive „ ..	42	2	..	2	48·3	2·30	103·9	3·03
5	Urinary „ ..	7	1	..	1	8·0	1·15	2·0	·05
6	Reproductive „ ..	*12	..	..	..	13·8	..	8·1	..
7	Locomotive „ ..	8	..	..	..	9·2	..	3·9	..
8	Integumentary „ ..	108	..	..	..	124·4	..	118·5	·15
	Class IV.								
4	Diseases of Nutrition ..	21	..	..	..	24·2	..	20·3	·55
	Class V.								
1	Accidents	88	4	..	4	101·3	4·60	88·2	3·28
2	Battle	..	..	..	..	..	..	·5	·15
3	Homicide	..	..	..	..	..	..	..	·25
4	Suicide	..	1	..	1	..	1·15	..	·45
6	Corporal Punishment ..	..	..	..	..	..	..	4·2	..
	Diseases not specified ..	..	..	..	..	..	..	15·3	·20
	Total	2,073	28	10	38	2385·5	43·72	2094·6	58·04

China. The admissions have been above, but the deaths considerably under the average of the preceding seven years. The difference in both has been chiefly in the class of miasmatic diseases.

Miasmatic Diseases, when sub-divided, give the following results:—

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 of Strength. 1866. Admitted.	1866. Died.	1859-65. Admitted.	1859-65. Died.
Eruptive Fevers	1	..	1·2	..	2·7	·42
Paroxysmal „	811	3	933·3	3·45	562·8	7·79
Continued „	391	2	449·9	2·30	230·3	4·44
Dysentery and Diarrhœa	146	8	165·7	9·21	261·2	17·30
Spasmodic Cholera	2	1	2·3	1·15	14·8	8·67
Sorethroat and Influenza	11	..	12·7	..	15·4	..
Ophthalmia	18	..	20·7	..	79·5	..
Rheumatism	40	..	46·0	..	57·0	·10

Paroxysmal and Continued Fevers were greatly above the average of the preceding seven years. In the 2nd Battalions 9th and 11th Regiments the cases were almost all of the intermittent type, while in the 20th Regiment they were chiefly of the continued and remittent forms. The admissions into hospital by all types of fevers were in the annual ratio of 1,761 per 1,000 of mean strength in the 20th, while in the 9th they were 1,148 and in the 11th 986 per 1,000. But it must be remembered that the 20th arrived in Hong Kong just at the commencement of the season when fevers prevail, while the other two corps were there during the comparatively healthy period of the year. The greatest number of cases of fever in the 9th and 11th Regiments occurred in January, and appeared to be a continuation of the epidemic which prevailed at Hong Kong during the last six months of 1865, and of which a detailed account was given in the last volume of the Department Reports. In the 20th Regiment fevers were very prevalent from the middle of June till the middle of December. The admissions in November amounted to nearly one-fourth of the strength of the corps.

The other diseases of this class were considerably under the average.

Enthetic Diseases, though under the average of previous years, have been more prevalent than in 1865. The difference has been in cases of gonorrhœa.

Diseases of the Digestive System have been greatly under the average, and also much lower than in 1865. The difference has been most marked in cases of dyspepsia.

Accidental and Violent Deaths.—Among these are included a case of poisoning by laudanum, and one in which the man committed suicide by throwing himself out of a window and dislocating his neck.

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2. Native or Asiatic Troops.

These consisted of a company of Gun Lascars, throughout the year, and of four companies of the Ceylon Rifles during the last seven months.

The average strength during the year was 285, the admissions into hospital were 605, and the deaths 12, being in the ratio of 2,123 and 42·11 per 1,000 of the strength; both greatly in excess of the average.

The admissions and deaths by each class of diseases are shown in the following Table. The details for 1866 will be found in Abstract No. XXV. of Appendix.

Orders.	Diseases.	Admissions.	Deaths.	Ratio per 1,000 of Mean Strength. 1866. Admitted.	1866. Died.	1861-65. Admitted.	1861-65. Died.
	Average Strength ..	285.					
	Class I.						
1	Miasmatic Diseases ..	447	10	1568·5	35·09	831·8	14·42
2	Enthetic „ ..	47	..	164·9	..	89·5	·69
3	Dietic „ ..	..	..	..	..	1·6	..
4	Parasitic „ ..	9	..	31·6	..	14·2	..
	Class II.						
1	Diathetic Diseases ..	3	..	10·5	..	11·2	·36
2	Tubercular „ ..	1	2	3·5	7·02	3·2	1·08
	Class III. Diseases of the—						
1	Nervous System	2	..	7·0	..	17·7	·12
2	Circulatory „	..	..	..	..	·6	·48
3	Respiratory „	25	..	87·7	..	78·2	2·77
4	Digestive „	10	..	35·1	..	47·2	·84
5	Urinary „	1	..	3·5	..	1·7	..
6	Reproductive „	4	..	14·0	..	1·7	·12
7	Locomotive „	2	..	7·0	..	1·9	·12
8	Integumentary „	26	..	91·2	..	57·7	..
	Class IV.						
4	Diseases of Nutrition.	11	..	38·6	..	19·8	2·88
	Class V.						
1	Accidents	17	..	59·7	..	56·8	·48
2	Battle	..	..	..	..	1·6	·12
3	Homicide	..	..	..	..	..	·12
4	Suicide	..	..	..	..	..	·24
5	Execution	..	..	..	..	..	·12
6	Corporal Punishment.	..	..	..	..	·9	..
	Diseases not specified	..	..	..	..	·6	..
	Total ..	605	12	2122·8	42·11	1237·9	24·87

The great excess in the admissions has been chiefly in miasmatic and enthetic diseases, and the mortality by the former has been more than double the average.

Miasmatic Diseases, when sub-divided, give the following results:—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Strength. 1866. Admitted.	1866. Died.	1861-65. Admitted.	1861-65. Died.
Eruptive Fevers ..	8	1	28·1	3·50	2·4	·12
Paroxysmal „ ..	109	2	382·5	7·01	507·0	2·13
Continued „ ..	189	3	663·2	10·53	17·6	1·30
Dysentery and Diarrhœa	82	3	287·7	10·53	154·4	6·62
Spasmodic Cholera ..	..	..	..	..	12·8	3·67
Sorethroat and Influenza	3	..	10·5	..	6·3	..
Ophthalmia	12	..	42·1	..	10·3	..
Rheumatism	36	..	126·3	..	100·4	·24

China. *Eruptive Fevers.*—All the admissions were cases of small-pox in the Ceylon Rifles; three of the cases are stated to have had marks of previous small pox, three marks of vaccination, and two, including the fatal case, marks of both.

Paroxysmal Fevers were considerably under the previous average. They were one-fourth more prevalent among the Gun Lascars than among the Ceylon Rifles, but all the cases of continued fever, except one, occurred in the latter corps. The surgeon in charge attributed their prevalence to the influence of the climate. Including both types of fever the admissions into hospital of the Ceylon Rifles were in the annual ratio of 1,143 per 1,000; but it must not be forgotten that the detachment of this corps was in Hong Kong during the latter half of the year only, the period when fevers most prevail.

Dysentery and Diarrhœa were much above the previous average, and were considerably more prevalent in the Ceylon Rifles than in the Gun Lascars. The greater number of cases of diarrhœa occurred in June and July, shortly after the arrival of the men, and of dysentery in the month of November, at the beginning of the cold season.

Enthetic Diseases were above the average, and were much more prevalent among the men of the Ceylon Rifles than in that portion of the regiment which was serving in Ceylon.

Diseases of the Integumentary System were also much in excess. Of the 26 admissions 23 occurred in the Ceylon Rifles, and of these 14 were cases of ulcer.

SANITARY REPORT.

Dr. Heffernan, Deputy Inspector-General of Hospitals, reporting upon the sanitary condition of the barracks and troops at this station, gives a succinct summary of the more important sanitary improvements introduced or completed during the year. These appear to have included:—

Increased cubic space to each man in the barracks and hospital; in the former it has been increased to 1,000 cubic feet in all the barracks except Alexander's House; in the hospital the space per man has been 1,500 feet. A sailing boat has been hired, to enable the convalescent sick to enjoy the breezes of the opposite side of the harbour.

The lower verandahs of the North Barrack, occupied by the Royal Artillery, were partly opened out, to allow a free current of air. The guard-room, being objectionable, was removed, and part of the basement in the east end of the main building converted into a guard-room. It is spacious and well situated, and allows upwards of 2,000 cubic feet for each man of the guard in its usual strength.

The gun lascars were removed from the mat huts to houses in the Canton Bazaar. Fireplaces were fitted into the native Chinese houses occupied by the families of the married Black troops, and pure water supplied by the Commissariat, as that of the neighbourhood was found to be bad.

At the Murray Barracks the verandahs were improved by removing every alternate board in the louvres, so as to allow a free ventilation through them; the ceilings of the rooms were taken away, leaving the joists exposed, and removing dead animals, &c., that had been the cause of offensive smells.

An allowance of meat was granted to such of the Black troops as wished for it or would consume it.

Drills and duties were diminished, and when the strength of the garrison was not sufficient to give the men seven nights in bed, night watchmen were hired to make up the deficiency; men on guard had a night meal provided for them.

Increased accommodation was provided for the married men, in a building called United States Naval Yard, and in St. Francis' Hospital, formerly a Roman Catholic religious establishment; in both these places the residents live exclusively on the upper floors.

The state of the vicinity of the different barracks varies a good deal, but the sloping position of the ground, and frequent heavy showers, aid the cleansing process very much.

In the last Sanitary Report for 1865, reference was made to the troops

having suffered severely, both at Kowloon and Hong Kong,* from remittent and intermittent fevers and dysentery, and it was stated that a Select Committee of the House of Commons had been appointed to inquire into the circumstances. As the 2nd Battalion 9th Regiment was one which had suffered very materially from the diseases in question, it may be interesting to note its sanitary condition during the year succeeding (1866). Surgeon-Major Saunders reports from Hong Kong, that intermittent fever prevailed to a considerable extent, as the result of the last hot season, and the causes of sickness to which the regiment had been exposed in 1865; but the men enjoyed comparatively good health during the months of January, February, March and April—the period embraced in his report. He attributes this improvement mainly to the following circumstances:— *China.*

1. The comparatively cool state of the weather, more especially at night.
2. Less harassing night duty.
3. The withdrawal of all men from Kowloon.
4. A greater amount of cubic space afforded to each man in barrack-rooms, and to each patient in hospital, than during the previous sickly season.
5. No delay in the dispatch of invalids to England.
6. The cheering prospect of the removal of the regiment to Japan. (The regiment proceeded to Japan in April.)
7. Less intemperance.

II. JAPAN.

STATISTICAL REPORT.

In April the 2nd Battalion 9th Regiment, from Hong Kong, relieved the 2nd Battalion 20th, which proceeded to China, at the same time a detachment of the 2nd Battalion 11th Regiment, embarked for Hong Kong to join the head-quarters, under orders for the Cape of Good Hope. *Japan.*

The average strength of European troops at Yokohama was 887, the admissions into hospital were 1,359 and the deaths 19, being in the ratio of 1,532 and 21·41 per 1,000 of mean strength.

The following Table shows the influence of the different classes of diseases in causing sickness and mortality among the troops. The details for 1866 are given in Abstract No. XXV. of Appendix.

* A sketch of the Medical History of Hong Kong during the first 15 years of its occupation will be found in the Appendix, page 596.

Japan.

Orders.	Diseases.	Average Annual Strength, 887.		Ratio per 1,000.			
				1866.		1864–5.	
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.						
1	Miasmatic Diseases	468	7	527·6	7·89	729·2	19·19
2	Enthetic „	502	..	566·0	..	352·5	..
3	Dietic „	12	..	13·5	..	34·1	..
4	Parasitic „	4	..	4·5	..	14·9	..
	Class II.						
1	Diathetic Diseases	3	..	3·4	..	..	..
2	Tubercular Diseases.. ..	14	2	15·8	2·25	5·7	..
	Class III.						
	Diseases of the—						
1	Nervous System	21	1	23·7	1·13	11·4	..
2	Circulatory „	1	2	1·1	2·25	4·3	1·42
3	Respiratory „	34	2	38·3	2·25	60·4	3·55
4	Digestive „	30	1	33·8	1·13	36·3	..
5	Urinary „	6	..	6·8	..	1·4	·71
6	Reproductive „	18	..	20·3	..	7·8	..
7	Locomotive „	8	..	9·0	..	4·3	..
8	Integumentary „	106	..	119·5	..	180·5	..
	Class IV.						
4	Diseases of Nutrition ..	4	..	4·5	..	22·0	..
	Class V.						
1	Accidents	123	3	138·7	3·38	163·5	3·55
4	Suicide	..	1	..	1·13	..	·71
5	Corporal Punishment ..	4	..	4·5	..	2·8	..
6	Malingering	1	..	1·1	..	3·6	..
	Total	1,359	19	1532·1	21·41	1634·7	29·13

The admissions and deaths have been under the average of the two preceding years; but neither the results of 1866, nor those of the previous period, represent correctly the influence of the climate of Japan on the health of European troops. In each year regiments have been sent there after the health of the men had been completely broken down by the climatic diseases of Hong Kong, and the steady manner in which they regained their efficiency affords strong testimony to the healthy character of the station.

Miasmatic Diseases have been considerably under the average of the two preceding years. When sub-divided they give the following results:—

Diseases.	Admitted.	Died.	Annual Ratio per 1,000. 1866. Admitted.	1866. Died.	1864-5. Admitted.	1864-5. Died.
Eruptive Fevers	13	..	14·7	..	24·9	2·84
Paroxysmal „	148	..	166·9	..	255·9	..
Continued „	92	5	103·7	5·64	142·1	5·13
Dysentery and Diarrhœa ..	31	2	34·9	2·25	104·5	5·69
Spasmodic Cholera	..	..	..	..	9·2	7·82
Sorethroat and Influenza ..	30	..	33·8	..	46·2	·71
Ophthalmia	73	..	82·3	..	57·6	..
Rheumatism	71	..	80·0	..	73·9	..

The admissions by *eruptive fevers* were all cases of small-pox, and occurred in men protected by previous vaccination.

Paroxysmal and Continued Fevers and *Diarrhœa and Dysentery* were much below the average of the preceding two years, but these were the diseases in which the influence of previous service in China were most likely to have been manifest. *Spasmodic Cholera* did not show itself among the troops during the year.

Ophthalmia was more prevalent than formerly, but the excess occurred in the 2nd Battalion 9th Regiment, which suffered from that disease to a considerable extent when serving in the Mediterranean in 1863-4, and appears never to have entirely got rid of it since that time.

Enthetic Diseases.—The admissions for venereal diseases during the year amounted to the very high proportion of 566 per 1,000 of mean strength. They are stated to be extremely common among the native population of Japan, and there are no measures in force to diminish them. Upwards of half of the cases were primary venereal sores. The proportion of secondary to primary cases was one to six and a half, and of bubo to primary cases, one to six.

Diseases of the Integumentary System show a marked reduction, which has been chiefly in cases of boils (*phlegmon*).

SANITARY REPORT.

Assistant-Surgeon Piper, of the 2nd Battalion 9th Regiment, in reporting on the climate, physical geography, and medical topography of Yokohama, says:—The climate is very variable, but on the whole healthy and agreeable. There appears to be frequent rain all the year round, often accompanied by high winds. The autumn is fine, open, bracing weather. Frosts commence about November. Snow falls, but does not remain long on the ground. The heat in summer averages about 80° F. in the shade. The nights are cool and refreshing. From my experience, I consider the climate well adapted to European constitutions, provided they are sound, otherwise the cold appears to be felt severely.

The country around consists of a succession of mountains, hills, and valleys, indented with harbours and bays, forming a very pretty and picturesque appearance. Every available spot of ground is cultivated to the fullest extent. The hills and slopes, where not covered with large fir and other trees, are sown with all kinds of cereals and crops for cattle. In all the valleys rice is grown abundantly. The soil appears a dark, rich, light, and fertile one, over a stiff greyish clay in some parts, and gravel in others. It is difficult to find a stone in any of the fields. The neighbourhood of the town is swampy, and is gradu-

Japan. ally being filled up for building purposes. The marshes are the rice-grounds. Nearly all kinds of cereals are grown, as are fruits and vegetables, with which the town is freely supplied. The mineral productions are said to be great. Paper is made in abundance, and silk and tea are the principal exports.

As intemperance and a loose morality are found among the Japanese, it is not surprising that their health decays prematurely. Strumous diseases, venereal and skin diseases, are very common. Almost every third child has some cutaneous disease of the scalp and body. The bath-houses are much used by them, but they do not appear to be so fond of changing their clothes as their neighbours the Chinese. Epidemics of smallpox occur more or less severely every year; and judging from the numbers seen marked with that scourge, vaccination has not been yet properly practised.

The huts are situated on a bluff overlooking the sea, north-east side, and commanding a good view of the town, about 150 feet above sea-level, separated from the town by a narrow creek from the sea. The position is the best that could have been chosen.

The spaces between the huts are insufficient and ought to be increased. The huts being built of light deal, and the roofs of a still thinner sort, plastered over, are constantly leaking and admitting draughts of wind, which become a constant source of annoyance. To ensure a more satisfactory sanitary condition, they require rebuilding.

Ventilation is carried on by a covered opening in the roof of each hut, and by means of the doors and windows. The rooms are warmed by iron stoves, in which are burned coals and wood. The amount of fuel has been lately increased. The insides of barrack huts are papered over occasionally as required. Bath-houses are required. Surgeon-Major Saunders recommends twelve baths for the North and three for the South Camp. There are ablution-rooms, well supplied with metal basins. Bathing parades took place three times a week during the summer months.

Assistant-Surgeon Piper concludes by saying that however agreeable and salubrious the climate for the healthy European constitutions, it is too trying for such as are prone to rheumatism, or have syphilitic poison in their blood. Men who have had syphilis are liable to severe secondary forms and rheumatism. Buboes occur also in a very large proportion. The rheumatism may be ascribed to the very changeable nature of the weather, and partly to the flimsy construction of the huts.

As a sanitary station for the recovery of invalids, he cannot recommend it highly. It is true some pick up health quickly when they have no organic disease. The climate is very variable, much wet falling, and the summer is too short and hot to prove useful to invalids from China; and the winter months are far too cold, rendering invalids liable to internal congestions and other dangerous maladies.

Section II.

n the Extent of Invaliding.

China and Japan. During the year there were 160 invalids sent to England from China and Japan, and 88 finally discharged the service at Netley, being respectively in the ratio of 91·12 and 50·11 per 1,000 of mean strength.

The disabilities for which the men were invalided and discharged are detailed in Abstract No. XXVI. of Appendix, from which the following classified summary has been framed:—

China and Japan.

	White Troops		Asiatic Troops
Mean Strength	1,756		285
	Sent as Invalids to England.	Discharged as Invalids in England.	Sent as Invalids to India.
Paroxysmal Fevers	108	38	..
Continued „	..	2	..
Dysentery and Diarrhœa ..	9	9	..
Ophthalmia	1	2	..
Rheumatism	2	1	..
Venereal Diseases	6	4	..
Diathetic „	1	2	..
Tubercular „	6	7	..
Diseases of the —			
Nervous System	4	1	..
Circulatory „	1	4	..
Respiratory „	2	2	1
Digestive „	14	10	..
Reproductive „	1	..	..
Locomotive „	..	1	1
Integumentary „	5	..	..
Diseases of Nutrition	..	3	..
Accidents and Violence ..	..	2	..
Total	160	88	2
Ratio per 1,000 of Strength { 1866 ..	91·12	50·11	7·02
Strength .. { 1861-5 ..	56·52	21·90	19·35

The proportion invalided to England, and finally discharged the service, was greatly above the average of the five preceding years. The chief disability was the result of the epidemic fever which prevailed to such an extent in China in the end of 1865; more than half of the men sent home, and nearly half of those discharged, having been found unfit for service from that cause. Only two of the native troops were discharged. The detachment of the Ceylon Rifles, having only gone to China in the middle of the year, naturally had no invalids to send to their head-quarters.

Section III.

Mean Daily Sick.

The average number constantly non-effective from sickness during the year was 90 of the European Force in China, 70 in Japan, and 20 of the Asiatic Force in China; being respectively in the ratio of:—

		European Force.		Asiatic Force.
		China.	Japan.	China.
Ratio per 1,000 of Strength constantly Sick	{ 1866..	103·6	78·9	70·2
	{ 1861-5	79·8	76·2*	49·0
		days.	days.	days.
Average Sick Time to each Soldier ..	{ 1866..	37·8	25·5	25·6
	{ 1861-5	29·1	27·8*	17·9
Average duration of Cases	{ 1866..	15·8	18·8	12·1
	{ 1861-5	15·1	17·5*	14·5

* For 1865 only.

China and Japan.

In China the mean daily sick of the Europeans was very high, amounting to upwards of one-tenth of the Force. In the Asiatic Force it was also much above the previous average, but this may have arisen, partly at least, from the greater part of these troops having been there during the unhealthy season only. In Japan there was a slight increase in the mean sick, and in the duration of the cases, but a decrease in the average sick time to each soldier. In China the duration of the cases among the Europeans differed little from previous results, but among the Asiatics it was much longer than in previous years.

Section IV.

Influence of Age on the Mortality.

The numbers living and deaths at each age in those corps which served in China and Japan during the whole year, with the ratio of deaths per 1,000, are shown in the following Table :—

	European Troops.											
	Under 20.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
Royal Artillery	6	..	21	1	56	2	6	2	..	..	..	..
2nd Batt. 9th Regt. ..	1	..	193	2	350	10	120	4	33	1	6	..
„ 20th „ ..	9	..	305	5	364	6	63	2	18	3	3	..
Total	16	..	519	8	770	18	189	8	51	4	9	..
Ratio of Deaths per 1,000 .. 1866	..		15·41		23·37		42·33		78·43		..	
.. 1861-5	7·44		40·92		72·06		64·31		153·97		230·77	

The deaths at each period of life have been considerably under the average of the five preceding years, but the results show the same rapid deterioration of life with the advance of age.

XII. ON THE HEALTH OF THE TROOPS SERVING IN INDIA.

Section I.

Sickness and Mortality.

India.

During 1866 the average strength of the European non-commissioned officers and men serving in the Indian Commands was 58,901; the admissions into hospital were 84,359, and the deaths 1,278, of which 157 occurred among invalids on their passage to England or at Netley. These numbers give the ratio of 1,432 admissions and 21·70 deaths per 1,000 of mean strength; both under the average of the six preceding years, and also lower than the proportion in 1865.

The following Table shows the amount of sickness and mortality in each of the Presidencies separately :—

	Average Strength.	Admissions into Hospital.	Deaths.			Ratio per 1000 of Mean Strength.			
						1866.		1860–65.	
			In India.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
Bengal	35,446	51,141	714	108	822	1,443	23·19	1,785	31·26
Madras	11,378	16,959	253	21	274	1,490	24·08	1,381	21·75
Bombay	12,077	16,259	154	28	182	1,346	15·06	1,654	25·21

The admissions and deaths were highest in Madras and lowest in Bombay They were lower than in 1865 in all the Presidencies, except the admission in Madras, which exceeded the ratio in that year by 40 per 1,000.

The admissions and deaths in Madras were above, but in the other two presidencies considerably below the average of the preceding six years.

I. Bengal.

STATISTICAL REPORT.

Bengal.

The average strength of the European Troops in the Bengal Command during the year was 35,446; the admissions into hospital were 51,141 and the deaths 822, of which 714 occurred in India and 108 among invalids on their passage home or at Netley. The admissions were in the proportion of 1,443 and the deaths of 23·19 per 1,000 of the strength, both less than in 1865.

The following Table shows the influence of the different classes of disease in causing sickness and mortality. The details are given in Abstract No. XXVIII. of Appendix :—

Bengal.

Orders.	Diseases.	1866. Strength, 35,446. Died. Admitted.	In India.	Of Invalids.	Total.	1866. Ratio per 1,000. Admitted.	Died.	1860–65. Ratio per 1,000. Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	25,128	250	30	280	708·9	7·90	991·0	17·70
2	Enthetic „ ..	7,333	14	8	22	206·9	·62	292·8	·31
3	Dietic „ ..	575	12	..	12	16·2	·34	10·5	·16
4	Parasitic „ ..	405	..	..	..	11·4	..	7·6	..
	Class II.								
1	Diathetic Diseases ..	424	10	..	10	12·0	·28	6·9	·20
2	Tubercular „ ..	394	61	35	96	11·1	2·71	11·0	2·49
	Class III. Diseases of the—								
1	Nervous System ..	1,274	40	5	45	35·9	1·27	34·7	2·04
2	Circulatory „ ..	382	47	10	57	10·8	1·61	9·9	·86
3	Respiratory „ ..	2,082	40	4	44	58·7	1·24	54·8	1·12
4	Digestive „ ..	4,781	113	10	123	134·9	3·47	135·9	3·82
5	Urinary „ ..	108	9	2	11	3·1	·31	2·7	·16
6	Reproductive „ ..	608	..	..	..	17·2	..	14 8	·01
7	Locomotive „ ..	205	..	..	..	5·8	..	5·7	·03
8	Integumentary „ ..	3,482	..	..	..	98·2	..	106·8	·07
	Class IV.								
4	Diseases of Nutrition.	419	10	..	10	11·8	·28	8·6	·20
	Class V.								
1	Accidents	3,442	88	4	92	97·1	2·59	85·3	1·38
2	Battle	..	..	..	..	..	..	·7	·21
3	Homicide	3	2	..	2	·1	·06	..	·02
4	Suicide	3	17	..	17	·1	·48	·1	·27
5	Execution	..	1	..	1	..	·03	..	..
6	Corporal Punishment	60	..	..	..	1·7	..	1·0	..
	Diseases not specified.	33	..	..	..	·9	..	3·8	·21
	Total	51,141	714	108	822	1442·8	23·19	178 4·6	31·26

The admissions by miasmatic and enthetic diseases, and the deaths by miasmatic diseases have been much below the average of the preceding six years.

MIASMATIC DISEASES, when sub-divided, give the following results:—

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 Strength. 1866. Admitted.	1866. Died.	1860-65. Admitted.	1860-65. Died.
Eruptive Fevers..	32	6	·9	·17	2·9	·36
Paroxysmal „	12,864	68	362·9	1·92	504.0	2·23
Continued „	3,323	45	93·7	1·27	148·0	1·51
Dysentery and Diarrhœa	4,398	83	124·1	2·34	141·3	3·98
Spasmodic Cholera..	71	46	2·0	1 30	14·4	8·82
Sorethroat and Influenza	800	..	22·6	..	20·6	·03
Ophthalmia	1,075	..	30·3	..	54·4	..
Rheumatism	2,169	2	61·2	·05	72·5	·07

Eruptive Fevers were considerably under the average. Of the admissions 25, and of the the deaths four, were by small-pox. With the exception of one man who had marks of previous small-pox, and one of the men who died regarding whom the information is deficient, all the cases are stated to have borne good marks of vaccination.

Paroxysmal and Continued Fevers were less frequent and less fatal than in 1865. The proportion of admissions by them was lower than in any of the six preceding years, and of deaths than in any year except 1864. The decrease in the admissions took place in paroxysmal fevers, the proportion of cases of continued fever having been higher than in 1864 and 1865, but lower than in the three preceding years.

Dysentery and Diarrhœa were also less prevalent and less fatal than in 1865 and were under the average of the six years.

Spasmodic Cholera.—The same remark applies to this disease, the mortality by which was less than in any of the six preceding years. It can scarcely be said to have prevailed as an epidemic among the troops except at Hazareebaugh, where, in July and August, the 27th Regiment lost eight and the Royal Artillery five men by it. At Allahabad the 107th Regiment had five deaths, and at Agra seven occurred among the troops assembled for the Durbar of the Viceroy.

Ophthalmia furnished exactly the same proportion of admissions as in 1865.

Enthetic Diseases continue to show a decrease, which, as in the previous year, was most manifest in the syphilitic group. This class, however, still furnishes one-seventh of the whole admissions. From the Quarterly Returns we have ascertained that the average number constantly sick in hospital with diseases of this class amounted in 1866 to 14·25 per 1,000 of the strength, the loss of service by these diseases to 5·2 days' service of the whole Force in the Command, and the average duration of the cases under treatment to 23·74 days. On dividing the diseases into syphilitic and gonorrhœal groups the loss of service by the former is found to be equal to 3·45, and by the latter to 1·75 days to each man serving, and the duration of the two groups respectively to be 27·85 and 18·37 days.

Accidental and Violent Deaths.—Although the proportion of deaths comprised in this class was lower than in 1865 it was considerably above the average. The deaths returned under the head of sunstroke were only half as numerous as in 1865, but the decrease in them was to some extent counterbalanced by an increase in those by drowning, which amounted to 23, two being returned as suicidal. The suicidal deaths altogether amounted to 17, being nearly double the average of the preceding six years.

The admissions and deaths at the principal stations in the Bengal Command are shown in the following Table:—

Bengal.

Stations.		Average Annual Strength.	Admitted into Hospital.	Died in India.	Annual Ratio per 1,000. Admitted.	Annual Ratio per 1,000. Died.
Presidency	Calcutta	867	1,056	16	1,218	18·45
	Dum Dum	695	1,696	26	2,440	37·41
	Barrackpore	495	862	17	1,741	34·34
	Berhampore	131	184	1	1,405	7·63
	Hazareebaugh	770	1,418	23	1,842	29·87
Allahabad	Allahabad	1,064	1,918	29	1,803	27·26
	Cawnpore	775	954	14	1,231	18·06
	Dinapore	907	1,729	26	1,906	28·67
	Benares	650	1,048	21	1,612	32·31
	Azimghur	92	186	1	2,022	10·87
Oude	Lucknow	2,197	2,724	36	1,240	16·39
	Seetapore	565	546	4	966	7·08
	Roy Bareilly	402	396	5	985	12·44
	Fyzabad	923	1,098	20	1,190	21·67
Saugor	Saugor	569	1,537	17	2,701	29·88
	Nagode	201	301	3	1,497	14·93
	Nowgong	199	296	7	1,487	35·18
	Jubbulpore	649	1,751	25	2,698	38·52
Rohilcund	Bareilly	770	700	6	909	9·81
	Shahjehanpore	506	718	6	1,419	11·86
	Moradabad	273	353	2	1,293	7·33
Gwalior	Morar	999	1,909	18	1,911	18·02
	Fort Gwalior	223	272	5	1,220	22·42
	Jhansi	446	1,017	5	2,280	11·21
	Seepree	98	226	..	2,306	..
Meerut	Meerut	1,561	2,352	15	1,507	9·61
	Agra	1,273	1,840	35	1,445	27·49
	Roorkee	344	289	5	840	14·53
	Delhi	471	645	15	1,369	31·85
	Muttra	398	470	8	1,181	20·10
	Futtyghur	196	236	8	1,204	40·82
Sirhind	Umballah	1,479	1,766	17	1,194	11·49
	Jullundur	611	1,159	1	1,897	1·64
	Dugshai	699	565	7	808	10·01
	Phillour	57	95	..	1,667	..
	Subathoo	488	728	2	1,492	4·10
Lahore	Meean-Meer	1,082	1,837	24	1,698	22·18
	Fort Lahore	112	305	2	2,723	17·86
	Fort Govindghur	144	146	2	1,014	13·89
	Fort Kangra	78	89	..	1,141	..
	Sealkote	1,114	1,400	16	1,257	14·36
	Ferozepore	662	1,103	5	1,666	7·55
	Mooltan	814	781	5	959	6·14
Peshawur	Peshawur	1,922	3,210	30	1,670	15·61
	Fort Attock	155	314	1	2,026	6·45
	Rawul Pindee	922	1,379	10	1,496	10·85
	Campbellpore	411	488	3	1,187	7·30
	Dera Ismael Khan	108	48	..	444	..
	Nowshera	587	1,357	9	2,312	15·33
Troops on March, detached, &c.		1,476	1,782	31	1,207	21·00
Bhootan Field Force		526	654	8	1,243	15·20
Convalescent Stations and Depôt Hospitals		1,433	2,485	81	1,734	56·52

The admissions into hospital were much above the average at Fort Lahore, Saugor, Jubbulpore, Dum Dum, Nowshera and Jhansi. Futtyghur, Jubbulpore, and Dum Dum were the stations at which the highest rates of mortality occurred, but there were several others at which they were much in excess of the average, as Nowgong, Barrackpore, &c. *Bengal.*

The admissions and deaths by the different classes of diseases in each of the Military Divisions are shown in the following Table :—

Class.	Military Divisions ...	Presidency.		Allahabad.		Oude.		Saugor.		Rohilcund.		Gwalior.		Meerut.		Sirhind.		Lahore.		Peshawur.		On the March.		Bhootan Field Force.		Depots.	
	Average Strength ...	3,050		3,518		4,092		1,626		1,559		1,884		4,281		3,380		4,064		4,482		868		579		1,433	
	Diseases	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.																										
1	Miasmatic Diseases ...	2,897	47	2,601	42	1,648	22	2,583	20	562	1	1,925	6	2,600	30	2,144	6	2,855	15	4,059	14	458	7	268	6	905	14
2	Enthetic ,, ...	750	...	1,305	3	1,221	3	266	1	363	...	385	...	945	...	460	...	691	2	572	...	272	1	70	...	336	4
3	Dietic ,, ...	46	1	42	1	128	1	22	...	21	...	56	...	84	...	41	...	82	1	30	1	6	2	3	...	21	3
4	Parasitic ,, ...	20	...	28	...	25	...	9	...	11	...	39	...	55	...	35	...	48	...	123	...	3	...	6	...	8	...
	Class II.																										
1	Diathetic Diseases ...	41	...	32	1	50	1	34	2	14	...	35	...	29	2	20	...	84	2	63	1	9	1	5	...	34	...
2	Tubercular ,, ...	42	8	58	7	42	1	12	5	33	4	13	1	50	5	36	3	39	6	31	3	6	..	4	...	86	15
	Class III.																										
	Diseases of the—																										
1	Nervous System...	122	5	185	6	131	5	109	2	37	1	55	2	184	5	92	..	134	3	156	2	17	2	23	...	122	5
2	Circulatory ,, ...	29	...	24	2	53	9	12	4	17	1	26	2	51	5	53	1	51	3	30	4	11	3	13	...	73	8
3	Respiratory ,, ...	191	7	172	...	171	2	119	6	113	1	103	1	233	8	238	2	250	1	347	...	57	3	39	1	105	7
4	Digestive ,, ...	618	14	480	16	437	14	312	7	249	3	280	6	555	10	405	6	503	9	625	8	97	5	93	...	345	16
5	Urinary ,, ...	11	...	12	1	12	...	6	1	8	...	7	...	14	...	9	...	8	1	11	3	5	...	3	...	11	1
6	Reproductive ,, ...	78	...	99	...	55	...	53	...	36	...	28	...	58	...	69	...	70	...	64	...	15	...	12	...	33	...
7	Locomotive ,, ...	19	...	22	...	31	...	14	...	11	...	16	...	15	...	6	...	16	...	20	...	8	...	5	...	33	...
8	Integumentary ,, ...	280	...	393	...	383	...	170	...	177	...	154	...	469	...	289	...	465	...	410	...	132	...	51	...	150	...
	Class IV.																										
4	Diseases of Nutrition ...	11	...	49	...	43	1	21	...	11	...	42	...	65	...	60	2	14	...	44	...	7	...	15	1	72	6
	Class V.																										
1	Accidents	272	6	359	12	314	4	138	4	128	3	255	8	425	19	398	3	416	9	495	15	88	...	78	...	139	2
3	Homicide	...	..	...	...	...	...	...	...	...	...	...	...	...	1	1	1	...	...	...	...	...	...	...	...	...	...
4	Suicide	...	1	...	1	1	2	...	...	...	...	...	2	...	1	...	2	2	2	...	4	...	...	...	...	1	...
5	Execution...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...
6	Corporal Punishment ...	4	...	13	...	7	...	1	...	1	...	1	...	10	...	7	...	4	...	6	...	...	...	1	...	...	...
	Not yet diagnosed ...	1	...	6	...	18	...	5	...	...	...	6	...	14	...	3	...	14	...	8	...	1	...	4	...	11	...
	General Total ...	5,432	89	5,880	92	4,770	65	3,886	52	1,792	14	3,436	28	5,856	86	4,366	27	5,746	54	7,094	55	1,192	24	693	8	2,485	81

RATIO per 1,000 of Mean Strength.

Class.	Military Divisions	Presidency.		Allahabad.		Oude.		Saugor.		Rohilcund.		Gwalior.		Meerut.		Sirhind.		Lahore.		Peshawur.		On the March.		Bhootan Field Force.	
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.																								
1	Miasmatic Diseases	949·9	15·41	739·3	11·94	402·8	5·38	1588·6	12·30	360·5	·64	1027·1	3·18	607·3	7·01	624·3	1·77	702·5	3·69	905·6	3·13	527·6	8·07	462·9	10·36
2	Enthetic ,, ...	245·9	...	371·0	·85	298·4	·73	163·6	·61	232·8	...	204·4	...	220·8	...	136·1	...	170·0	·49	127·6	...	313·3	1·15	120·9	...
3	Dietic ,, ...	15·1	·33	11·9	·28	31·3	·24	13·5	...	13·5	...	29·7	...	19·6	...	12·1	...	20·2	·25	6·7	·22	6·9	2·30	5·2	...
4	Parasitic ,, ...	6·6	...	8·0	...	6·1	...	5·5	...	7·1	...	20·7	...	12·8	...	10·3	...	11·8	...	27·4	...	3·4	...	10·4	...
	Class II.																								
1	Diathetic Diseases	13·4	...	9·1	·28	12·2	·24	20·9	1·23	9·0	...	18·6	...	6·8	·47	5·9	...	20·7	·49	14·1	·22	10·4	1·15	8·6	...
2	Tubercular ,, ...	13·8	2·62	16 5	1·99	10·3	·24	7·4	3·08	21·2	2·57	6·9	·53	11·7	1·17	10·6	·89	9·6	1·48	6·9	·67	6·9	...	6·9	...
	Class III.																								
	Diseases of the—																								
1	Nervous System ...	40·0	1·64	52·6	1·71	32·0	1·22	67·0	1·23	23·7	·64	29·2	1·06	43·0	1·17	27·2	...	33·0	·74	34·8	·45	19·6	2·30	39·7	...
2	Circulatory ,, ...	9·5	...	6·8	·57	13·0	2·20	7·4	2·46	10·9	·64	13·8	1·06	11·9	1·17	15·7	·30	12·6	·74	6·7	·89	12·7	3·46	22·5	...
3	Respiratory ,, ...	62·6	2·29	48·9	...	41·8	·49	73·2	3·69	72·5	·64	54·7	·53	54·4	1·87	70·4	·59	61·5	·25	77·4	...	65·7	3·46	67·4	1·73
4	Digestive ,, ...	202·6	4·59	136·4	4·55	106·8	3·42	191·9	4·31	159·7	1·92	148·6	3·18	129·6	2·33	119·8	1·77	123·8	2·21	139·5	1·78	111·7	5·76	160·6	...
5	Urinary ,, ...	3·6	...	3·4	·28	2·9	...	3·7	·61	5·1	...	3 7	...	3·3	...	2·7	...	2·0	·25	2·5	·67	5·8	...	5·2	...
6	Reproductive ,, ...	25·6	...	28·1	...	13·4	...	32·6	...	23·1	...	14·9	...	18·5	...	20·4	...	17·2	...	14·3	...	17·3	...	20·7	...
7	Locomotive ,, ...	6·2	...	6·3	...	7·6	...	8·6	...	7·1	...	8·5	...	3·5	...	1·8	...	3·9	...	4·5	...	9·2	...	8·6	...
8	Integumentary ,, ...	91·8	...	111·7	...	93·6	...	104·5	...	113·5	...	81·7	...	109·6	...	85·5	...	114·4	...	91·5	...	152·1	...	88·1	...
	Class IV.																								
4	Diseases of Nutrition	3·6	...	13·9	...	10·5	·24	12·9	...	7·1	...	22·3	...	15·2	...	17·8	·59	3·4	...	9·8	...	8·1	...	25·9	1·73
	Class V.																								
1	Accidents	89·2	1·97	102·1	3·41	76·7	·98	84·9	2·46	82·1	1·92	135·3	4·25	99·3	4·44	117·8	·89	102·4	2·21	110·4	3·35	101·4	...	134·7	...
3	Homicide	...	...	...	...	...	...	...	...	...	...	...	..	...	·23	...	·30	...	...	..	...	...	...	...	...
4	Suicide	...	·33	...	·28	·2	·49	...	...	...	...	...	1·06	...	·23	...	·59	·5	·49	...	·89	...	...	...	...
5	Execution	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	·30	...	...	...	...	...	...	...	...
6	Corporal Punishment	1·3	...	3·7	...	1·7	...	·6	..	·6	...	·5	...	2·3	...	2·1	...	1·0	...	1·3	...	...	...	1·7	...
	Not yet diagnosed	·3	...	1·7	...	4·4	...	3·1	...	...	...	3·2	...	3·3	...	·9	...	3·4	...	1·8	...	1·2	...	6·9	...
	General Total	1781·0	29·18	1671·4	26·14	1165·7	15·87	2389·9	31·98	1149·5	8·97	1823·8	14·85	1367·9	20·69	1291·7	7·99	1413·9	13·29	1582·8	12·27	1373·3	27·65	1196·9	13·82

Bengal. Compared with the results for 1865 this Table shows a reduction in the mortality in all the Military Divisions, and in the admissions in all except Saugor, Gwalior, and Lahore, in each of which there has been an increase; as in that year, the highest ratio of admissions occurred in the Saugor and the lowest in the Rohilcund Division, while the highest mortality was also in the Saugor and the lowest in the Sirhind Division.

MIASMATIC DISEASES, when subdivided, furnish the following results:—

Military Divisions.	Eruptive Fevers.		Paroxysmal Fevers.		Continued Fevers.		Dysentery and Diarrhœa.		Spasmodic Cholera.		Sorethroat and Influenza.		Ophthalmia.		Rheumatism.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Presidency	..	..	1,667	10	116	3	727	16	25	17	46	..	97	..	181	1
Allahabad	6	1	1,276	11	235	7	557	10	20	13	52	..	176	..	245	..
Saugor	..	..	2,050	15	29	..	242	4	..	..	62	..	29	..	152	1
Oude	6	..	376	8	343	4	430	10	3	..	56	..	173	..	211	..
Rohicund	..	..	242	1	24	..	146	..	..	..	8	..	29	..	91	..
Gwallior	..	..	1,449	2	19	2	221	2	..	..	55	..	63	..	97	..
Meerut	5	1	703	4	641	14	648	5	11	6	103	..	135	..	269	..
Sirhind	6	1	1,342	1	67	1	332	3	..	..	90	..	93	..	199	..
Lahore	4	1	1,467	5	416	5	406	4	..	..	104	..	126	..	289	..
Peshawur	4	2	1,813	3	1,315	4	360	5	..	..	151	..	102	..	263	..
On the March	1	..	184	1	39	1	114	3	1	2	14	..	25	..	77	..
On Field Service	..	..	73	1	32	..	88	4	1	1	20	..	13	..	40	..
Ratio per 1,000 of Mean Strength.																
Presidency	..	..	546·6	3·28	38·0	·98	238·4	5·24	8·2	5·57	15·1	..	31·8	..	59·3	·33
Allahabad	1·7	·28	362·7	3·13	66·8	1·99	158·3	2·84	5·7	3·70	14·8	..	50·0	..	69·6	..
Saugor	..	..	1260·8	6·23	17·8	..	148·8	2·46	..	..	38·1	..	17·8	..	93·5	·61
Oude	1·5	..	91·9	1·96	83·8	·98	105·1	2·44	·7	..	13·7	..	42·3	..	51·6	..
Rohicund	..	..	155·2	·64	15·4	..	93·7	..	..	..	5·1	..	18·6	..	58·4	..
Gwallior	..	..	769·1	1·06	10·1	1·06	117·3	1·06	..	..	29·2	..	33·4	..	51·5	..
Meerut	1·2	23	164·2	·93	149·7	3·27	151·4	1·17	2·6	1·40	24·1	..	31·5	..	62·8	..
Sirhind	1·8	·30	397·1	·30	19·8	·30	98·2	·89	..	..	26·6	..	27·5	..	58·9	..
Lahore	1·0	·25	361·0	1·23	102·3	1·23	99·9	·98	..	..	25·6	..	31·0	..	71·1	..
Peshawur	·9	·45	404·5	·67	293·4	·89	80·3	1·12	..	..	33·7	..	22·8	..	58·7	..
On the March	1·2	..	211·9	1·15	44·9	1·15	131·3	3·46	1·2	2·30	16·1	..	28·8	..	88·7	..
On Field Service	..	..	126·1	1·73	55·3	..	152·0	6·90	1·7	1·73	34·5	..	22·5	..	69·1	..

Bengal. *Eruptive Fevers* were the cause of very little sickness and mortality. None of these prevailed epidemically among the troops in any of the Military Divisions.

Paroxysmal Fevers.—The ratio of admissions by this group was much higher than in 1865 in the Saugor, Gwalior, and Presidency Divisions, and also, though to a less extent, in the Sirhind and Lahore Divisions. In the Presidency Division they prevailed to a great extent in the 91st at Dum Dum, 785 admissions having occurred during the year in a strength of 674 men, being in the ratio of 1165 per 1,000. May and June were the months in which they were most prevalent, 195 cases having been admitted in the former and 139 in the latter. In the Saugor Division the ratio of admissions was extremely high, amounting to 1,261 per 1,000 of the strength. At Saugor the Artillery had 271 admissions in a strength of 171, and the 1st Battalion 7th Regiment 429 in a strength of 403 men. At Jubbulpore in the same Division the Artillery had 131 admissions in 115 men, and the 1st Battalion 23rd Regiment 1,108 in 858. The four last months of the year were those in which fevers were most prevalent, the admissions into hospital in the 23rd Regiment having been 209 in September, 288 in October, 311 in November, and 124 in December. In the Gwalior Division the Artillery at Jhansi had 155 cases in 130 men; the 104th Regiment at Morar and Fortress Gwalior 707 in 793 men, and the 34th Regiment at Morar 496 cases in 626 men. In the Sirhind Division the 51st Regiment at Jullundur had 666 cases of paroxysmal fevers in a strength of 548, at Mean Meer, in the Lahore Division, the 6th Battery 22nd Brigade, R.A., had 190 cases in an average strength of 73 men, and the 82nd Regiment 552 cases in 876 men, and in the Peshawur Division the 90th at Nowshera had 697 cases in 580 men.

Continued Fevers were very prevalent in the Meerut and Peshawur Divisions; in the former the 41st Regiment at Agra, in a strength of 769 men had 263 cases, and in the latter, the 1st Battalion 19th, at Peshawur, had 670 cases in a strength of 769 of which 395 occurred in May. The 42nd Regiment at the same station had 271 cases in a strength of 718 men.

Dysentery and Diarrhœa were much above the average in the Presidency, Allahabad, Saugor, and Meerut Divisions, while the Peshawur Division furnished the lowest ratio of admissions. In the Presidency Division the 91st Regiment at Dum Dum and Barrackpore, and the 27th at Hazareebaugh had a large number of cases; in the Allahabad Division the 105th at Dinapore and the 107th at Allahabad, in the Saugor Division the A Battery 16th Brigade, R.A., and the 1st Battalion 7th Regiment at Saugor, and in the Meerut Division the 41st Regiment at Agra and the 2nd Battalion Rifle Brigade at Meerut were the corps in which these diseases were most prevalent.

Spasmodic Cholera.—In July cholera was very prevalent at Hazareebaugh in the Presidency Division. In the end of the month it attacked the troops, when six cases and five deaths occurred in the Battery of Artillery, and 12 cases with eight deaths in the 27th Regiment. About the same time 11 cases and seven deaths occurred at Allahabad. At Agra 11 cases and six deaths occurred in November among the troops assembled on the occasion of the Governor-General holding a Durbar. When cholera appeared among the troops they were removed as soon as possible from the station, and the disease did not spread among them. In the wing of the 58th Regiment, at Benares, four cases, all of which terminated fatally, occurred in the month of August, the disease being at the time epidemic among the civil population.

Enthetic Diseases were less prevalent than in 1865 in all the Military Divisions except Oude and Lahore. In the former the proportion was raised by the prevalence of syphilis in the 1st Battalion 11th Regiment at Fyzabad, and the 2nd Battalion 12th Regiment at Seetapore and Moradabad, and of gonorrhœa in the 46th Regiment at Lucknow. The proportion of admissions in the Lahore Division, though somewhat higher than in the preceding years was considerably under the average of the Command. The Allahabad Division furnished much the highest ratio of cases, the excess being chiefly owing to the prevalence of both syphilis and gonorrhœa in the 105th Regiment at Dinapore, in which the admissions by venereal diseases amounted to 395 per 1,000 of the strength, in the left wing of the 58th Regiment at Benares, in which they were 587 per 1,000, and in the 88th Regiment at Cawnpore, in

which they were 279 per 1,000. The Peshawur Division furnished the smallest proportion of cases, amounting only to 128 per 1,000 of the strength. *Bengal.*

Diseases of the Digestive System were a source of considerable sickness and mortality throughout the Command, the admissions ranging from 107 per 1,000 in Oude to 202 per 1,000 in the Presidency Division, and the deaths from 1·77 in the Sirhind to 4·59 in the Presidency Division. Much the most prevalent and fatal disease of this class was inflammation of the liver, upwards of two-fifths of the cases and four-fifths of the deaths by diseases of the digestive system having been caused by it.

Diseases of the Integumentary System.—The left wing of the 98th Regiment, which occupied Delhi till November, having begun to suffer from the "Delhi sore," it was removed by companies to Roorkee, being replaced by companies of the Head Quarters wing at that station, and this is stated to have had some influence on the disease, 46 cases only having occurred during the year. The 2nd Battery 25th Brigade, R.A., had 21 cases in an average strength of 67 men.

Accidental and Violent Deaths.—The most frequent cause was heat-apoplexy, or sunstroke, of which 102 cases occurred, and 50 terminated fatally. The 41st Regiment at Agra had 15 cases and nine deaths, the 90th at Nowshera had eight cases and six deaths, and the 91st at Dum Dum and Barrackpore had seven cases and six deaths. Of the deaths 22 occurred in June, 16 in July, nine in May, and one in March, August, and October respectively.

The sickness and mortality in each corps serving in the Command during the year are shown in the following Table :—

Corps.	Average Strength for the Year.	Admitted into Hospital.	Died.			Annual Ratio per 1,000.		Stations during the Year.
			In India.	Of Invalids.	Total.	Admitted.	Died.	
CAVALRY.								
2nd Dragoon Guards	471	507	12	..	12	1076·5	25·47	Muttra, 12 months.
7th ,, ,, ...	440	629	8	3	11	1429·6	25·00	Benares, 12 months; Wing at Cawnpore, 11 months.
5th Lancers	433	439	8	1	9	1013·9	20·78	Lucknow, 12 months.
7th Hussars	538	484	6	3	9	899·6	16·73	Sealkote, 12 months.
19th ,, ...	475	794	3	1	4	1671·6	8·42	Meerut, $9\frac{2}{3}$ months; on the march, $\frac{1}{3}$ month; Camp Agra, $\frac{2}{3}$ month; on the march, $\frac{1}{3}$ month; Meerut, $\frac{2}{3}$ month.
20th ,, ...	485	551	7	3	10	1136·1	20·62	Campbellpore, 12 months.
21st ,, ...	469	509	9	..	9	1085·3	19·19	Umballa, 12 months.
Total Cavalry	3,311	3,913	53	11	64	1181·8	19·33	
ROYAL ARTILLERY.								
A Brigade, R. H. A.	705	1,074	19	..	19	1523·4	26·95	A Battery, on the march, $2\frac{1}{3}$ months; Meerut, $7\frac{1}{3}$ months; on the march, $2\frac{1}{3}$ months. B ,, Delhi, 1 month; on the march, 1 month; Meean-Meer, 10 months. C ,, Benares, $\frac{1}{2}$ month; on the march, 1 month; Lucknow, $10\frac{1}{2}$ months. D ,, Meerut, $1\frac{2}{3}$ month; on the march, $\frac{1}{3}$ month; Meerut, 9 months; on the march, 1 month. E ,, Umballa, 12 months.

Corps.	Average Strength during the Year.	Admitted into Hospital.	Died.			Annual Ratio per 1,000.		Stations during the Year.
			In India.	Of Invalids.	Total.	Admitted.	Died.	
C Brigade, R.H.A.	153	275	6	1	7	1797·4	45·75	C Battery, Benares, $\frac{1}{3}$ month; Calcutta, $\frac{1}{3}$ month; Embarked for England. D ,, Agra and Calcutta, $\frac{2}{3}$ month; Embarked for England. E ,, Delhi and Calcutta, $\frac{2}{3}$ month; Embarked for England. F ,, Benares, 12 month.
F ,, ,, ...	742	1,420	18	1	19	1913·8	25·61	A ,, Umballa, 12 months. B ,, Sealkote, 12 months. C ,, Morar, 12 months. D ,, Peshawur and Rawul Pindee, 12 months. E ,, Mecan-Meer and Peshawur, 12 months. F ,, Peshawur, 12 months.
8th Brigade, R. A.	74	117	1	..	1	1581·1	13·51	B ,, Arrived from England 29th October; Lucknow, 2 months. C ,, Arrived from England 29th October; Fyzabad, 2 months. D ,, Arrived from England 29th October; Seetapore, 2 months.
11th ,, ,, ...	826	921	9	7	16	1115·0	19·37	A ,, Fyzabad, 11 months; on the march, 1 month. B ,, Lucknow, 11½ months; on the march, ½ month. C ,, Seetapore, 11 months; on the march, 1 month. D ,, Meerut, 9⅔ months; on the march ⅓ month; Agra, 2 months. E ,, Morar, 12 months. F ,, Bareilly, 12 months. G ,, Cawnpore, 12 months.

Corps.	Average Strength for the Year.	Admitted into Hospital.	Died.			Annual Ratio per 1,000.		Stations during the Year.
			In India.	Of Invalids.	Total.	Admitted.	Died.	
16th Brigade, R.A.	943	1,998	44	4	48	2118·8	50·90	A Battery, Jubbulpore .. .. 12 months. B ,, Saugor .. .. 12 months. C ,, Barrackpore .. .. 12 months. D ,, Barrackpore .. .. 12 months. E ,, Saugor .. .. 12 months. F ,, Dinapore .. .. 12 months. G ,, Hazareebaugh, 11 months; on the march, 1 month.
19th ,, ,, ...	971	1,548	11	1	12	1594·3	12·36	A ,, Ferozepore, 12 months. B ,, On the march, $\frac{1}{3}$ month; Rawul Pindee, $11\frac{2}{3}$ months. C ,, Agra, $10\frac{2}{3}$ months; on the march, $\frac{1}{3}$ month; Meerut, 1 month. D ,, Mooltan .. .. 12 months. E ,, Peshawur .. .. 12 months. F ,, Meean-Meer .. .. 12 months. G ,, Jullundur .. .. 12 months.
22nd ,, ,, ...	650	1,260	8	1	9	1938·5	13·85	A ,, Meerut, $10\frac{1}{2}$ months; on the march, 1 month; Allahabad, $\frac{1}{2}$ month. B ,, Jhansi .. .. 12 months. C ,, Lucknow .. .. 12 months. D ,, Peshawur .. .. 12 months. E ,, Morar .. .. 12 months. F ,, Meean-Meer .. .. 12 months. G ,, Julpigoree, $2\frac{1}{2}$ months; on the march, 1 month; Agra, $8\frac{1}{2}$ months.

Corps.	Average Strength for the year.	Admitted into Hospital.	Died. In India.	Died. Of Invalids.	Died. Total.	Annual Ratio per 1,000. Admitted.	Annual Ratio per 1,000. Died.	Stations during the year.
24th Brigade, R.A.	421	624	8	1	9	1482·2	21·38	No. 1 Battery, Mooltan .. .. } 12 months. No. 2 ,, Meean-Meer .. .. } No. 3 ,, Peshawur, ⅓ month; on the march, 2⅓ months; Meerut, 9⅓ months.
25th ,, ,, ...	343	646	13	2	15	1883·4	43·73	No. 4 ,, Allahabad .. .. } No. 5 ,, Morar .. .. } No. 6 ,, Umritsir .. .. } No. 1 ,, Saugor .. .. .. } 12 months. No. 2 ,, Delhi .. .. .. } No. 3 ,, Calcutta and Dum Dum } No. 4 ,, Fort Attock .. .. } No. 5 ,, Julpigoree, 2⅓ months; Darjeeling, 9⅔ months. No. 6 ,, Buxa Dooar, 2 months; on the march, 1 month. Broken up on 30th March.
Brigade not specified	..	..	..	4	4	..	..	
Total Royal Artillery	5,828	9,883	137	22	159	1695·8	27·28	
INFANTRY.								
1st Battalion, 3rd Foot	89	106	2	..	2	1191·0	22·47	Arrived from England. Calcutta, 1½ months.
1st ,, 7th ,, ...	719	1,309	21	2	23	1820·6	31·99	On the march, ⅓ month; Saugor, 11⅔ months; Detachment at Nowgong, 11⅔ months.
1st ,, 11th ,, ...	842	947	20	2	22	1124·7	26·12	Fyzabad, 12 months.
2nd ,, 12th ,, ...	458	496	4	3	12	1083·0	13·82	Seetapore, 12 months.
Do. ,, ,, ,, Right Wing ..	410	399	5			973·2		Roy Bareilly, 12 months.

Corps.	Average Strength for the Year.	Admitted into Hospital.	Died.			Annual Ratio per 1,000.		Stations during the Year.
			In India.	Of Invalids.	Total.	Admitted.	Died.	
1st Battalion, 19th Foot..	872	1,508	21	1	22	1729·4	25·23	Peshawur, 12 months.
1st ,, 20th ,, ...	760	808	14	5	19	1063·2	25·00	Dinapore, 1½ months; Calcutta, 10 months. Embarked for England.
1st ,, 23rd ,, ...	858	1,806	33	1	34	2105·4	39·63	Jubbulpore ..
27th Regiment	847	1,424	26	..	26	1681·2	30·70	Hazareebaugh ..
34th ,, ...	626	1,274	18	1	19	2035·1	30·35	Gwalior .. .. } 12 months.
35th ,, ...	788	653	4	1	5	829·7	6·35	Mooltan .. ..
36th ,, H. Q.	283	357	2	} 2	10	{1261·5	{12·76	Moradabad ..
Do. ,, Left Wing	501	733	6			{1463·1		Shahjehanpore ..
37th ,, ...	117	139	2	..	2	1188·0	17·09	Arrived from England. On the march, 1⅓ months; Bareilly, ⅔ month.
38th ,, ...	694	952	6	2	8	1371·8	11·53	Subathoo, 9⅔ months; on the march, 1 month; Sealkote, 1½ months.
41st ,, ...	796	1,282	23	..	23	1610·5	28·89	Agra .. .. }
42nd ,, ...	768	751	9	2	11	977·9	14·32	Peshawur .. } 12 months.
46th ,, ...	817	1,010	10	1	11	1236·2	13·46	Lucknow .. }
51st ,, ...	706	1,216	5	..	5	1722·4	7·08	Jullundur, 10⅔ months; on the march, 1 month; Kurrachee, ½ month.
54th ,, ...	..	..	2	3	5	..	..	Embarked for England on the 3rd January.
55th ,, ...	936	1,084	24	10	34	1158·1	36·33	Calcutta, ½ month; on the march, 1 month; Lucknow, 10½ months.
58th ,, H. Q.	440	515	2	} 6	21	{1170·5	{26·92	Senchal .. .. } 12 months.
Do. ,, Left Wing	340	606	13			{1782·4		Benares .. .. }
77th ,, ...	769	626	5	2	7	814·0	9·10	Bareilly, 9⅔ months; on the march, ⅓ month; Agra, 1 month: on the march, 1 month.

Corps.	Average Strength for the Year.	Admitted into Hospital.	Died.			Annual Ratio per 1,000.		Stations during the Year.
			In India.	Of Invalids.	Total.	Admitted.	Died.	
79th Regiment	767	942	11	1	12	1228·2	15·65	Rawul Pindee, 10 months; on the march, 1½ months; Roorkee, ½ month.
80th „	120	61	3	..	3	508·3	25·00	On the march, 1⅔ months. Embarked for England.
82nd „	874	1,324	21	1	22	1514·9	25·17	Meean-Meer, 12 months.
88th „	760	857	23	4	27	1127·7	35·53	Cawnpore, 10 months; Agra, 1 month; on the march, 1 month.
90th „	677	1,404	11	2	13	2073·9	19·20	Nowshera, 12 months. Detachment at Attock.
91st „	856	2,064	33	3	36	2411·2	42·06	Dum Dum, 12 months. Detachment at Barrackpore.
93rd „	703	866	12	1	13	1231·9	18·49	Sealkote, 10 months; on the march 2 months.
94th „	780	1,053	10	3	13	1350·0	16·67	Umballa, 12 months.
97th „	679	1,205	11	2	13	1774·7	19·15	Saugor and Nowgong, ½ month; on the march, 1 month; Ferozepore, 10½ months.
98th „ H. Q.	383	302	8	2	17	788·5	25·33	Roorkee, 10 months; Meerut, 2 months.
98th „ Left Wing	288	389	7			1350·7		
101st „	899	682	22	3	25	758·6	27·81	Dugshai, 9⅓ months; on the march, 1⅓ months; Cawnpore, 1⅓ months.
104th „	793	1,289	14	4	18	1625·5	22·70	Jhansi, 12 months. Detachment at Gwalior and Seepree.
105th „	762	1,510	20	..	20	1981·6	26·25	Arrived from Madras; Dinapore, 11 months.
107th „	854	1,534	23	3	26	1796·3	30·44	Allahabad, 12 months.
2nd Battalion, Rifle Brigade	807	1,022	12	2	14	1266·4	17·35	Meerut, 10 months; on the march, 1 month; Calcutta, 1 month.
3rd „ „	740	824	2	..	2	1113·5	2·70	Rawul Pindee, 3 months; Murree Hills, 7 months; Rawul Pindee, 2 months.
Total Infantry	26,178	37,329	520	75	595	1426·0	22·73	

Bengal. As in the preceding year the sickness and mortality were highest in the Artillery and lowest in the Cavalry. The highest ratio of admissions in any corps was 2,411 per 1,000 in the 91st Regiment at Dum Dum and Barrackpore, and was caused by the prevalence of fever, dysentery, and diarrhœa. The 16th Brigade, R.A., stationed in the Presidency Division furnished the highest proportion of deaths. The admissions were remarkably low in the 101st Regiment stationed during the greater part of the year at Dugshai, and the deaths in the 3rd Battalion Rifle Brigade, which occupied Rawul Pindee for five months and was employed in road making on the hills near Murree during seven months, amounted to only 2·70 per 1,000 of the strength. The 35th at Mooltan, the 51st at Jullundur, the 19th Hussars at Meerut, and the 77th Regiment at Bareilly had also very low death rates, the proportion not having amounted in any of them to one per cent. of the strength.

SANITARY REPORT.

The following extract has been made from the Annual Sanitary Report of the British troops serving in the Bengal Command in 1866, prepared by Surgeon-Major A. D. Home, C.B., V.C.

It would be satisfactory to be able to state that the fewer admissions into hospital and the fewer deaths in 1866 are distinctly results due to the prevision exercised in the way of sanitary precautions for the avoidance of disease, but, though it is natural to contrast a year with the one immediately preceding it, in this instance the deductions so obtained would be fallacious. In the report for 1865 it was stated that the year was an exceptionally unhealthy one, and the excess of unhealthiness was there shown to be due to the prolonged hot weather felt at certain stations, which acted disastrously in giving rise to heat apoplexy, and causing deaths far in excess of what may (for the sake of illustration) be termed the normal number of deaths to be expected in a year from heat apoplexy. In 1866 the hot weather was neither excessive nor unduly prolonged; the rains set in at the expected time, and to this regularity in the seasons is to be ascribed the lower death rate of 1866 over that of 1865. The great difference in number between the deaths in a normal and in an abnormal season, from this one disease, may be seen in the following Table:—

Year.	Deaths due to Heat Apoplexy.	Ratio per 1,000 of Strength to Deaths due to Heat Apoplexy.
1865	121	3·25
1866	61	1·72

Thus, in 1866, there were 44 lives saved, which would have been lost in 1865, by this disease alone.

Whilst the admissions into hospital and the deaths in 1866 are shown to have been fewer than in the preceding year, the amount of invaliding is seen to have been considerably higher; the explanation of this circumstance is easy: there are now much greater facilities for invaliding men, and those who in former years would have been kept in the country and would have died there, or at least have continued ineffective, are now sent home. Probably the maximum invaliding rate has not yet been reached this year, high as it is; but in reality the present amount of invaliding does not weaken the army more than the sparing amount of former years. The services of men with impaired constitutions could never be reckoned upon; kept in India they swelled the muster rolls of the Command, but not the effective strength of regiments.

In concluding this subject, it may be stated that, though the vital statistics

of the army in this Command do not every successive year show the results to be expected from the increasing care bestowed on sanitary matters, yet if longer periods are taken, periods of five years, it will be seen that the advance in healthiness is substantial and continuous, notwithstanding the occasional interruptions in a particular year, caused by epidemic influences, against which we have not yet succeeded in guarding.

During 1866 there were few representations made in the sanitary reports, received from regimental medical officers, of defects in existing barracks, which are capable of easy remedy; such as have been stated are noted further on in the paragraphs referring to the separate heads under which it is convenient to classify such subjects. It is understood that the necessity which exists in the interest of the health of the troops for abandoning certain notoriously unhealthy stations, is subordinate to the higher necessities, political and military, which demand their continued occupation; whilst again, the inherent difficulties in the way of effecting organic improvements at such places, so as to make the best of them, are very difficult to overcome. The most common disease from which soldiers suffer in this country is ague. Experience in all countries, England included, shows that the complete extirpation of ague is merely a matter of drainage. Every one knows this, but to drain even the neighbourhood of the cantonments in this Command would be so gigantic a work as to be practically out of the question. Even the thorough deep drainage of the actual sites on which the barracks are built would greatly promote the health of the men; but the material difficulties in the way of such a project make it a thing to be desired more than to be expected.

Granting that our efforts are powerless against the great natural insanitary evils due to the climate, soil, and physical configuration of the country, there is yet much to be done towards conserving the health of the soldiers in the Command, by combating other evils, the remedies against which, though difficult of application, are not insuparably difficult. The most prominent amongst these is the spread of infectious diseases from the civil population to soldiers. In 1866 one of the diseases most readily communicable (small-pox) has not been so prevalent as in the preceding year, and consequently the troops have suffered less from it, but the universal practice of vaccination amongst the natives would probably extinguish the disease, as far as the soldiers are concerned.

During the past year an infectious fever has been very prevalent amongst the natives in many parts of the Command, and in some instances there is reason to suspect it was communicated to the troops. Even when such fevers are known to be about, isolation of the troops is hardly practicable, and at present we have only the power of mitigating the diffusion of similar sickness by temporarily vacating infected barracks. To prevent its establishment, means must be taken to arrest it amongst the natives.

Venereal diseases have caused in 1866 slightly fewer admissions into hospital than in 1865, being 206 admissions per 1,000 of the strength against 213 per 1,000 of the strength in 1865; but the after consequences have been especially disastrous, 14 men have died directly from venereal disease. At nearly all the stations occupied by the army the police measures sanctioned by the Legislature have been put in force for the purpose of controlling this evil. If the figures in the return of diseases are to be taken as indicating the working of the regulations, we find that they have produced a very slight decrease in the number of cases and a fourfold virulence in the character of the malady; but here figures would probably lead astray. It is only when dealing with very large numbers and in enquiries extending over a series of years, that statistical evidence becomes unimpeachable. With reference to this matter, it is probable that the evidence of one year is inconclusive. It is also probable that secondary causes, not necessary to be detailed, may have adversely affected the operation of the police regulations.

Barracks.

During the year new barracks were being erected at Saugor and Kussowlie for the depôt there.

At Ferozepore and at Sinchal building was about to commence.

Bengal. Improvements and alterations were made in the following barracks:—

Saugor (occupied by the 16th Battalion, Royal Artillery).—Additional windows were put in, adding to the cheerfulness and aiding ventilation.

Umballa (occupied by 94th Regiment).—The barracks were re-built.

Umballa occupied by 21st Hussars).—The walls were raised, giving additional cubic space and better ventilation.

Jubbulpore (occupied by the 1st Battalion, 21st Regiment).—Great improvements; the walls were raised, and new doors and windows made.

Bareilly (occupied by 37th Regiment).—The ventilation was improved.

Ferozepore (occupied by A Bat. 19th Brig., Royal Artillery).—Sundry improvements made.

In the reports received from regimental medical officers, objections are taken to certain barracks; these may be summarized under the following heads:—

Fault of position.—Meerut (occupied by the Royal Horse Artillery).—The arrangement of the blocks of building is bad; the current of air is intercepted from some.

Ferozepore (occupied by the A Bat. 19th Brig., Royal Artillery).—The same objection as the preceding.

Imperfect ventilation.—Umballa (occupied by the E Bat. A Brig., Royal Horse Artillery).

Bareilly (occupied by the F Bat. 11th Brig., Royal Artillery).—Insufficiently ventilated (in winter only when the doors are shut).

Lucknow (occupied by the 46th Regiment).—The same objection as the preceding.

Not sufficiently raised from ground.—Agra (occupied by the D Bat. 11th Brig., Royal Artillery).

Allahabad (occupied by the E Bat. 16th Brig., Royal Artillery).

At Dum Dum (occupied by the 91st Regiment), the lower rooms were said to be "damp, dark, and badly ventilated, and unfit for occupation."

At Moradabad (occupied by the wing 36th Regiment) the buildings are said to be "never intended for barracks," and that they are not healthy buildings.

Cubic and superficial space in Barracks.—In these particulars the troops have been generally very favourably placed; the allowance of space has usually been most ample, and at some stations in the hot weather it has been further increased by allowing sleeping tents for a part of the men.

The smallest amount of cubic space recorded in the year at any station in the plains was at Dum Dum (91st Regiment), where the average space for the year was 1,300 feet. At hill stations the lowest allowance of cubic space recorded is at Landour, where the average for the year of the men in the Convalescent Depôt was only 693 feet. This, during the invalid season, must have fallen below the minimum. At Dugshai, 819 cubic feet, and at Sinchal, 819 cubic feet were the averages for the year.

Warming of Barracks.—At Umritsur, occupied by 6th Bat. 24th Brig. Royal Artillery, fireplaces were constructed in the barracks.

At Lucknow, Morar, and Bareilly, the medical officers recommend that fires be allowed in barracks during part of the cold season, not only on account of the cold, but to ventilate the rooms when the doors are closed.

Married Men's Quarters.—The notices made concerning the quarters occupied by married soldiers are few, and such defects as are pointed out might, it is presumed, be readily removed by representation to the local military authorities.

Ablution.—Judged by the standard of former years, the arrangements for ablution existing in 1866 at the very worst provided station would appear most ample, and even judged with reference to the more exacting ideas of the present day, but little exception can be taken to the arrangements in this matter at any station. Very few complaints are made in the regimental sanitary reports of insufficient or defective provision for personal ablutions. Of such notices some refer to trivial matters; those of any importance will be stated presently. It is gathered that at certain stations where the water

has to be fetched from the distance, the establishment of water carriers is insufficient for due efficiency. *Bengal.*

It is satisfactory to find that during the year, means have been taken at most stations to secure greater privacy for men taking baths. The connection between outward decency and health may not be a point easily demonstrable, but few will deny that the exposure necessitated by want of privacy in bathing is debasing.

The practice of furnishing every man with a basin of his own seems now to be pretty general; as it extends so will the health of the troops be improved by the diminished prevalence of infectious ophthalmia.

During 1866 new plunge baths have been constructed at the following places:—

Fyzabad (in barracks occupied by C Bat. 8th Brig. Royal Horse Artillery, and 1st Battalion 11th Regiment).

Lucknow (in barracks occupied by 5th Lancers and 46th Regiment).

Cawnpore (in barracks occupied by G Bat. 11th Royal Artillery).

The ablution accommodation has been materially increased in the barracks at Umballa, Attock, Muttra, Meerut, Ferozepore, Cawnpore.

At the following stations the ablution accommodation is reported to be deficient:—

Subathoo (occupied by 38th Regiment), there was no plunge bath.

Dugshai (occupied by 101st Regiment), there was no plunge bath, and the other accommodation was bad.

Morar (occupied by C Bat. F Brig. Royal Horse Artillery), there was no plunge bath.

Cells and Guard-Rooms.—During 1865 improvements have been made in the buildings intended for the confinement of prisoners at many stations, but it seems from the statements made by medical officers in their reports that a good deal remains to be done in this respect. It is difficult to disassociate in the mind the idea of prisoners and punishment, but it is clear that there should be nothing of a penal character about the amount of supply of fresh air to a criminal. It is not meant for one moment to insinuate here that the ventilation of cells is or has been designedly neglected. When most of the cells at present in use were built, neither the importance of good ventilation nor the means to insure it were understood so fully as now; the consequence is that many of the present bulldings are incapable of substantial improvement. The local authorities at some places during the year have acknowledged this evil, and have remedied it by transferring prisoners for long periods to other stations having better prison accommodation, and with other prisoners have removed them during the hot season from the cells to some other buildings. Improvements have been made during the year in the places of confinement at the following stations:—

Mean Meer (occupied by B Bat. A Brig. Royal Horse Artillery).

Bareilly (occupied by the 77th Regiment, and F Bat. 11th Brig. Royal Horse Artillery), ventilation improved. A thermantidote used in the hot season.

Barrackpore (occupied by Royal Artillery).

Benares (occupied by 7th Dragoon Guards), new cells were constructed.

Jubbulpore (occupied by 1st Battalion 23rd Regiment).

Shahjehanpore (occupied by 36th Regiment).

Rawul Pindee (occupied by 79th Regiment).

Jhansie (occupied by 104th Regiment), a dry room built.

Murree (occupied by Commissariat Depôt) have been much improved.

At the following places the cells for prisoners are reported to be faulty:—

Meerut (occupied by Royal Horse Artillery). The superficial space is insufficient, and the position of the building precludes it from benefiting by the prevailing wind.

Ferozepore (occupied by A Bat. 19th Brig. Royal Artillery). Stated generally to be very objectionable.

Agra (occupied by C. Bat. 19th Brig. Royal Artillery). The superficial space only 80 feet; the ventilation also is bad.

Hazareebaugh (occupied by 27th Regiment). Badly ventilated.

Bengal. Umballa (occupied by the 94th Regiment). The garrison cells said to be badly constructed, and without proper ventilation.

Duties.—During the year (one in which neither military operations were carried on, nor extraordinary marches undertaken) the duties of the men have been the ordinary ones incidental to their profession. As no statements are made to the contrary in the regimental sanitary reports, it is inferred that in no instance have the duties been prejudical to health. In certain cases, during the exceptional prevalence of illness during the year, (as in the B Bat. A Brig. Royal Horse Artillery, at Meean Meer) the duties of the men in respect of night guards were suspended, and similar consideration was shown in the B Bat. 16th Brig. Royal Artillery, at Saugor, in lightening the men's duties.

Suggestions are made in some reports for the erection of roofed lines for Cavalry and Artillery horses, a measure certain to be beneficial to the men employed in dressing the horses.

Clothing.—The clothing of the Infantry soldier in this Command is not the subject of complaint in a single report. As was the case in the reports of former years, the medical officers of Artillery and of some Cavalry regiments, recommend that serge clothing, similar to that used by the Infantry, should be issued to the men of those branches of the service. Both the comfort and health of the men would be increased were this done.

Diet.—The ration of the soldier in this Command has remained unchanged during the year both in composition and quantity. No complaints are made by medical officers in their reports of its insufficiency, but they often record the fact of the men subscribing for extra messing.

The increased attention paid by the Commissariat to the condition of animals before slaughter has worked advantageously. At certain stations, notably in the Punjaub, the use of diseased meat has produced tape-worm in the men. During the year attention has been directed to this subject, statements made have been verified, and information obtained with a view to a remedy being applied.

At certain stations during certain seasons, when vegetables are scarce, lime-juice was issued to the men to ward off scurvy, and with good effect.

Cooking.—It cannot be said that any substantial improvements have been made in the cooking arrangements in use in former yeas. At Lucknow, in the cook-house of the 55th Regiment, a kitchen range was erected, and one was erected also for the use of the B Bat. 16th Brig., at Saugor. In this last instance the value of the apparatus was neutralized by the want of sufficient fuel for its proper employment.

Hospitals.—Amongst the subjects to be reported on in the general sanitary report for the Command is the one of hospitals for sick soldiers. As, however, it is understood that the whole hospital question is at present under examination, as the subject is so extensive, and is one so mixed up with technical professional details as to be unsuitable for superficial examination, it is thought right to exclude it from this report.

Note.—A Report on Epidemic Cholera in 1867 in the Punjaub, North-Western and Central Provinces, will be found in the Appendix, pages 335 to 380.

II. MADRAS.

STATISTICAL REPORT.

Madras.

The average strength of the European troops in the Madras Command during 1866 was 11,378. The admissions into hospital amounted to 16,959, and the deaths to 253 in India, and 21 among the invalids on their passage home and at Netley. These numbers give the proportions of 1,490 admissions, and 24·08 deaths per 1,000 of mean strength, which differ very slightly from the results in the preceding year.

The diseases by which the admissions and deaths were occasioned are detailed in Abstract No. XXVIII. of Appendix, from which the following classified Table has been framed :—

Orders.	Diseases.	Strength, 11,378.				Ratio per 1,000 of Mean Strength.			
			Deaths.			1866.		1860–65.	
		Admitted.	In the Command.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	6,864	112	5	117	603·3	10·11	545·0	9·09
2	Enthetic „ ..	2,729	1	2	3	239·8	·26	258·6	·39
3	Dietic „ ..	238	2	..	2	20·9	·18	18·4	·15
4	Parasitic „ ..	141	..	..	..	12·4	...	12·3	..
	Class II.								
1	Diathetic Diseases ..	94	5	..	5	8·3	·44	5·9	·21
2	Tubercular „ ..	208	20	11	31	18·3	2·72	16·7	2·00
	Class III. Diseases of the—								
1	Nervous System ..	418	12	2	14	36·7	1·23	37·2	1·47
2	Circulatory „ ..	319	23	1	24	28·0	2·11	15·4	1·13
3	Respiratory „ ..	643	5	..	5	56·5	·44	53·2	·66
4	Digestive „ ..	1,924	44	2	46	169·1	4·04	142·5	3·87
5	Urinary „ ..	42	1	..	1	3·7	·09	2·9	·19
6	Reproductive „ ..	239	..	..	..	21·0	..	16·2	..
7	Locomotive „ ..	66	1	..	1	5·8	·09	5·0	·01
8	Integumentary „ ..	1,461	1	..	1	128·4	·09	127·4	·09
	Class IV.								
4	Diseases of Nutrition..	251	3	..	3	22·0	·26	6·9	·18
	Class V.								
1	Accidents	1,267	18	..	18	111·4	1·58	110·9	1·90
4	Suicide	..	5	..	5	..	·44	..	·22
6	Corporal punishment..	37	..	..	..	3·2	..	2·5	..
	No appreciable Disease	18	..	..	..	1·6	..	·3	..
	Diseases not specified..	..	..	..	..	..	..	4·1	·19
	Total	16,959	253	21	274	1490·4	24·08	1381·4	21·75

The admissions and deaths have been above the average of the preceding six years, the excess being chiefly in miasmatic diseases and in those of the digestive and circulatory systems.

Madras. MIASMATIC DISEASES when subdivided give the following results :—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength			
			1866.		1860-65.	
			Admitted.	Died.	Admitted.	Died.
Eruptive Fevers..	15	3	1·3	·26	·8	·06
Paroxysmal „	1,591	11	139·9	·97	166·6	·73
Continued „	1,166	13	102·5	1·14	75·1	1·29
Dysentery and Diarrhœa	2,450	53	215·3	4·66	167·5	2·71
Spasmodic Cholera..	38	28	3·3	2·47	6·7	3·18
Sorethroat and Influenza	260	..	22·8	..	15·7	..
Ophthalmia..	445	..	39·1	..	35·1	..
Rheumatism.	640	2	56·2	·18	64·2	·01

With the exception of *Paroxysmal Fevers*, *Spasmodic Cholera*, and *Rheumatism*, all the diseases have furnished a proportion of admissions above the average of the preceding six years. The prevalence of paroxysmal fevers and dysentery and diarrhœa has differed very slightly from what occurred in 1865.

Spasmodic Cholera was less prevalent and less fatal than in 1865. The only stations at which it prevailed to any extent among the troops were Thayetmyo, Trichinopoly, Secunderabad, and Kurnool, at the latter station among a party sent from Ramandroog in the month of August to rejoin the head-quarters of their regiment at Secunderabad.

Ophthalmia was slightly above the average. One-fourth of all the admissions by it occurred in the 76th Regiment at Bellary. The medical officer in charge does not offer any explanation of its prevalence in the corps. The admissions were most numerous from May to November. The 2nd Battalion 21st Regiment, which in 1864 and 1865 suffered to a great extent from ophthalmia, did not exceed the average of the Command during the year under observation.

ENTHETIC DISEASES, though under the average of the six years, were more prevalent than in 1865. The increase has been chiefly in cases of gonorrhœa.

PARASITIC DISEASES.—The admissions by these diseases were one-third less numerous than in 1865. They included 61 cases of guinea worm, of which 58 occurred in the 108th Regiment in the Lower Trimulgherry Barracks at Secunderabad. This was exactly half the number of cases which occurred in this regiment occupying the same barracks in 1865. None of the other corps at Secunderabad had any admissions by this disease.

DISEASES OF THE CIRCULATORY SYSTEM show a large increase upon the numbers in 1865, and have been nearly double the average of the proportion returned in the six years 1860-5. The increase has taken place in cases of inflammation of the heart (*carditis*). There seems reason however to doubt the accuracy of the returns on this head, and to fear that cases of functional derangement of the heart's action have been erroneously returned as inflammation. This view is supported by the very low mortality of the cases, which amounted only to 1 in 42, and by the great excess reported in certain corps ; for instance, 47 cases appear in the return of the 18th Hussars, 12 in the 2nd Battalion 10th, and 12 in the 2nd Battalion 24th Regiment. While 127 cases were returned from the Madras Command, there were only 10 from Bengal, and 3 from Bombay. The Surgeon of the 18th Hussars attributes the large number of these cases in the corps to "the inordinate use of tobacco amongst the men, who appear to be regularly saturated with nicotine."

The following Table shows the admissions and deaths at each station in the Madras Command :—

Stations.		Average Annual Strength.	Admitted into Hospital.	Died in India.	Ratio per 1,000 of Strength.	
					Admitted.	Died.
Sea Coast ..	Fort St. George and St. Thomas's Mount	963	1,828	25	1,898·2	25·69
	Cannanore	722	991	10	1,372·6	13·85
	Calicut	83	48	2	578·3	24·10
	Palaveram	43	40	..	930·2	..
Plains ..	Trichinopoly	229	319	5	1,393·0	21·83
	Malleapooram	84	32	..	380·9	..
Table Lands .	Bangalore	1,900	1,565	27	823·7	14·21
	Bellary	813	1,739	11	2,139·0	13·53
	Secunderabad	2,772	3,905	85	1,408·7	30·66
	Kamptee	1,095	1,822	21	1,663·9	19·18
Hill Station .	Wellington	315	611	6	1,939·7	19·04
Birmah ..	Rangoon	707	1,595	16	2,256·1	22·63
	Tonghoo	467	649	6	1,389·7	12·85
	Thayetmyo	570	591	10	1,036·9	17·54
	Port Blair	110	171	1	1,554·7	9·09
Singapore ..	Singapore	135	179	1	1,325·9	7·41
	Penang	74	161	2	2,175·7	27·03
Depôts ..	Poonamallee	199	529	17	2,658·3	85·43
	Chindwarrah	50	107	3	2,140·0	60·00
	Ramandroog	44	79	1	1,795·5	22·73
Troops on the March		204	154	4	734·9	19·61

Omitting the Depôts, the highest ratio of admissions occurred at Rangoon, and of deaths at Secunderabad.

The influence of the different classes of diseases on the sickness and mortality at each of the groups of stations is shown in the following Table :—

Order.	Diseases.	Stations on Sea Coast.		Stations on Plains.		Stations on Table Lands.		Hill Station.		Birmah.		Singapore.		Depôts.		Stations on Sea Coast.		Stations on Plains.		Stations on Table Lands.		Hill Station.		Birmah.		Singapore.		Depôts.	
	Average Strength	1,811		313		6,580		315		1,854		209		293		Annual Ratio per 1,000 of Strength.													
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.																												
1	Miasmatic Diseases ...	1061	11	138	4	3936	67	171	2	1151	18	115	...	258	9	585·9	6·08	440·9	12·77	598·2	10·18	542·9	6·35	620·8	9·71	550·2	...	880·6	30·72
2	Enthetic ,, ...	586	1	41	...	1466	...	90	...	410	...	37	...	112	...	323·6	·55	131·0	...	22·8	...	285·7	...	221·1	...	177·0	...	382·3	...
3	Dietic ,, ...	36	...	2	...	165	1	2	...	17	1	10	...	7	...	19·9	...	6·4	...	25·1	·15	6·4	...	9·2	·54	47·9	...	23·9	...
4	Parasitic ,, ...	19	...	4	...	95	...	2	...	20	...	1	...	2	...	10·5	...	12·8	...	14·4	...	6·4	...	10·8	...	4·8	...	6·8	...
	Class II.																												
1	Diathetic Diseases ...	17	...	4	...	50	1	5	1	10	...	...	...	5	2	9·4	...	12·8	...	7·6	·15	15·9	3·18	5·4	...	...	...	17·1	6·83
2	Tubercular ,, ...	28	5	2	...	91	10	21	...	29	...	3	1	36	5	15·5	2·76	6·4	...	13·8	1·52	66·7	...	15·6	...	14·3	4·78	122·9	17·06
	Class III. Diseases of the—																												
1	Nervous System ...	66	6	19	...	143	3	30	...	117	1	10	1	32	...	36·4	3·31	60·7	...	21·7	·45	95·2	...	63·1	·54	47·9	4·78	109·2	...
2	Circulatory ,, ...	38	...	6	1	150	12	42	2	47	4	3	1	33	3	21·0	...	19·2	3·19	22·8	1·84	133·3	6·35	25·3	2·16	14·3	4·78	112·6	10·24
3	Respiratory ,, ...	96	1	12	...	338	4	41	...	149	...	18	...	24	1	53·0	·55	38·3	...	51·4	·60	129·9	...	80·4	...	86·1	...	81·9	3·41
4	Digestive ,, ...	398	10	48	...	849	27	89	1	376	3	30	...	136	1	219·8	5·52	153·3	...	129·0	4·10	282·5	3·18	252·3	1·62	143·6	...	464·2	3·41
5	Urinary ,, ...	8	...	...	...	13	1	11	...	8	...	...	...	3	...	4·4	...	...	...	2·0	·15	34·9	...	4·4	...	...	...	10·2	...
6	Reproductive ,, ...	43	...	7	...	131	...	8	...	29	...	12	...	11	...	23·7	...	22·4	...	19·9	...	25·4	...	15·6	...	57·4	...	37·5	...
7	Locomotive ,, ...	18	...	2	...	24	...	5	...	14	...	1	...	2	...	9·9	...	6·4	...	3·7	...	15·9	...	7·6	...	4·8	...	6·8	...
8	Integumentary ,, ...	245	...	22	...	747	...	54	...	308	1	41	...	26	...	135·3	...	70·2	...	113·5	...	171·4	...	166·1	·54	196·2	...	88·7	...
	Class IV.																												
4	Diseases of Nutrition ...	25	1	9	...	115	2	10	...	80	...	1	...	11	...	13·8	·55	28·8	...	17·5	·30	31·8	...	43·1	...	4·8	...	37·5	...
	Class V.																												
1	Accidents	215	2	34	...	687	12	28	...	234	4	53	...	17	...	118·7	1·11	108·6	...	104·4	1·84	88·9	...	126·2	2·16	253·6	...	58·0	...
3	Homicide	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	Suicide	...	...	...	...	...	4	...	...	...	1	...	...	...	...	...	...	...	...	...	·60	...	...	...	·54	...	...	...	...
6	Corporal Punishment ...	5	...	1	...	22	...	2	...	2	...	5	...	...	...	2·8	...	3·2	...	3·3	...	6·4	...	1·1	...	23·9	...	...	...
	Diseases not specified ...	3	...	...	...	9	...	...	...	5	...	...	...	...	...	1·6	...	...	...	1·4	...	...	...	2·7	...	...	...	...	...
	Total	2907	37	351	5	9031	144	611	6	3006	33	340	3	715	21	1605·2	20·43	1121·4	15·96	1372·5	21·88	1939·6	19·06	1621·3	17·81	1626·8	14·34	2440·2	71·67

Compared with the results for 1865 the proportion of admissions into hospital has been higher in all the groups, except the stations on the Plains and Table Lands; and that of the deaths lower except on the Table Lands, at the Hill Station and at the Depôts.

MIASMATIC DISEASES have been more prevalent than in 1865 at all the groups of stations except those on the Plains, where there was a slight decrease; but the mortality has been lower than in that year at all except those on the Table Lands, where the ratios correspond closely, and at the Depôts, where the proportion of deaths has been much higher.

The following Table shows the admissions and deaths by the principal diseases comprised in this class :—

Madras.

Diseases.	Ratio per 1,000 of Strength.																							
	Stations on Sea Coast.		Stations on Plains.		Stations on Table Lands.		Hill Station.		Birmah.		Singapore.		Poonamallee, Ranandroog, and Chindwarrah.		Stations on Sea Coast.		Stations on Plains.		Stations on Table Lands.		Hill Station.		Birmah.		Singapore.		Poonamallee, Ranandroog, and Chindwarrah.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Eruptive Fevers ...	...	...	...	...	14	3	...	...	...	...	1	...	...	...	...	...	...	...	2·1	·46	...	...	...	...	...	...	...	...
Paroxysmal ,, ...	...	...	47	...	1079	9	72	...	183	2	38	...	55	1	57·4	...	150·0	...	164·0	1·37	228·5	...	98·7	1·08	181·8	...	187·7	3·41
Continued ,, ...	...	...	3	...	472	6	1	...	335	5	5	...	23	...	180·6	1·66	9·6	...	71·7	·91	3·2	...	180·7	2·69	23·9	...	78·5	...
Dysentery and Diarrhœa ...	...	6	45	...	1434	31	39	2	395	9	16	...	100	5	231·9	3·31	143·8	...	217·9	4·71	123·8	6·35	213·0	4·85	76·6	...	341·3	17·05
Spasmodic Cholera ...	...	2	6	3	20	17	...	...	4	2	...	...	1	1	3·9	1·11	19·2	9·58	3·1	2·58	...	...	2·2	1·08	...	...	3·4	3·41
Sorethroat and Influenza ...	...	...	2	...	131	...	16	...	68	...	23	...	3	...	9·4	...	6·4	...	19·9	...	50·8	...	26·7	...	110·0	...	10·2	...
Ophthalmia	...	...	23	...	291	...	13	...	45	...	11	...	21	...	22·1	...	73·5	...	44·2	...	41·3	...	24·3	...	52·6	...	71·7	...
Rheumatism	...	...	8	...	345	1	28	...	80	...	16	...	47	1	39·6	...	25·5	...	52·4	·15	88·9	...	43·1	...	76·6	...	160·4	3·41

Eruptive Fevers.—The admissions by this group all occurred at stations on the Table Lands, except one case of chicken-pox at Singapore. There were 8 admissions and 2 deaths by small-pox; of these, 4, including the two fatal cases, occurred at Bangalore, 3 at Secunderabad, and 1 at Bellary. All are stated to have borne marks of vaccination, and one of the fatal cases is also stated to have previously had small-pox. There were 5 admissions and one death by measles at Secunderabad, and there was also a case of chicken-pox at the same station. *Madras.*

Paroxysmal Fevers were more prevalent than in 1865 at the stations on the plains, the Hill Station, and Singapore. Kamptee, as in previous years, furnished the highest proportion of cases, the admissions being equal to half the strength, and at Secunderabad it was also considerably above the average of the Command.

Continued Fevers were considerably more prevalent than in the preceding year at the stations on the seacoast and in Birmah. In the latter, the excess occurred in the 2nd Battalion 24th Regiment at Rangoon, in July, August, and September, and was attributed by the medical officer in charge to the extreme heat of the season. The number of cases in this corps amounted to 326, of which 74 were admitted into hospital in July, 120 in August, and 35 in September. At the stations on the seacoast, the 102nd Regiment at Cannanore, and the 3rd Battalion 60th, at Fort St. George, furnished the greatest number of cases. In both corps the prevalence of fever was attributed to the extreme heat of the season. Besides these corps, the Royal Artillery at Bangalore, and the 18th Hussars, and 2nd Battalion 21st Regiment at Secunderabad had a high proportion of cases of continued fever.

Dysentery and Diarrhœa.—The only stations at which there has been an appreciable increase in these diseases during the year have been those in Birmah and the Depôts, while there has been a marked decrease in their prevalence at Singapore, the Hill Station, and the Stations on the Plains. At Secunderabad, dysentery was extremely prevalent in the 108th Regiment, and diarrhœa in the 18th Hussars. At Bellary, the 76th had a large number of admissions by diarrhœa; at Fort St. George, the 3rd Battalion 60th, and at Rangoon, the 2nd Battalion 24th suffered to a considerable extent from dysentery; and at Cannanore the 102nd from dysentery and diarrhœa.

Spasmodic Cholera can scarcely be said to have prevailed as an epidemic among the troops during the year, except at Secunderabad, but sporadic cases occurred at a large number of stations. At Secunderabad there were 14 cases and 12 deaths; at Trichinopoly 6 and 3; at Bangalore, 3 and 3; at Fort St. George, 5 and 1; at Thayetmyo, 4 and 2; at Bellary, 1; at Palaveram, 1; and at each of the following stations one fatal case, viz., St. Thomas's Mount, Kamptee, and the Depôt at Poonamallee. In addition to these, three men died at Kurnool, on the march to Secunderabad, as already noticed, and one man, attached to the public works, died out of hospital at Bellary. Of the regiments at Secunderabad the 108th furnished 6 cases and 5 deaths.

Ophthalmia was much more prevalent than in 1865 in the group of Stations on the Plains. This was owing to its occurrence as an epidemic in the 76th Regiment at Bellary between May and November. There were 114 admissions in that corps; the Medical Officer in charge has given no statement of the causes to which in his opinion it might be attributed.

Enthetic Diseases show a considerable increase at the stations on the Sea Coast, the Hill Station, and Singapore, but have undergone a reduction at the Stations on the Plains. The 60th Regiment at Fort St. George had the greatest number of cases, the admissions having exceeded in number half the strength of the corps.

Diseases of the Digestive System have been a source of considerable inefficiency and mortality. The principal diseases of this class have been inflammation of the liver and dyspepsia as regards admissions into hospital, and the former as a cause of death. One-half of the cases, and upwards of four-fifths of the deaths by this class were caused by inflammation of the liver, and one-third of the cases by dyspepsia. They were most prevalent at the Depôts and the Hill Station, which probably should have been grouped with the Depôts, and they were also the cause of a large number of admissions at the Stations on the Sea Coast, and in Burmah.

Madras. ACCIDENTAL AND VIOLENT DEATHS.—In this class are included 13 deaths from sunstroke. Of these 8 occurred at Secunderabad, 2 at Kamptee, 2 at Thayetmyo, and 1 at Calicut. There were 5 suicidal deaths, being double the average proportion of the preceding six years; two at Kamptee, one at Secunderabad, one at Bangalore, and one at Rangoon.

The admissions into hospital and deaths in each corps were as follows :—

Regiments.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Annual Ratio per 1,000.		Stations during the Year.
			In Madras.	Of Invalids.	Total.	Admitted.	Died.	
CAVALRY.								
1st Dragoon Guards	62	58	1	..	1	935·5	16·13	On march, 1½ months; Bangalore, 1 month; embarked for England.
16th Lancers	549	496	11	..	11	903·5	20·04	Bangalore, 12 months.
18th Hussars	501	1,141	27	..	27	2,277·5	53·90	Secunderabad, 12 months.
Total Cavalry	1,112	1,695	39	..	39	1,524·3	35·07	
ROYAL ARTILLERY.								
D Brigade, R.H.A.	573	1,073	12	1	13	1,872·6	22·68	A Battery, Bangalore .. B „ Secunderabad C „ Kamptee .. D „ Bellary .. } 12 months.
14th Brigade, R.A...	429	591	10	..	10	1,377·6	23·31	A Battery, Bangalore .. B „ Trimulgherry C „ Kamptee .. } 12 months.
17h de, R.A...	331	328	3	1	4	990·9	12·08	Head Quarters, Madras, 2 months; 1 and 2 Batteries embarked for England; 4 and 6 Batteries, Singapore, 12 months; 5 Battery, Tonghoo, 12 months.
20th Brigade, R.A.	722	1,109	19	1	20	1,536·0	27·71	Head-Quarters and F Battery, Kamptee, 12 months A Battery, Rangoon .. B „ Madras .. C „ Thayetmyo .. D „ Cannanore .. E „ Secunderabad } 12 months.

Regiments.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Annual Ratio per 1,000.		Stations during the Year.
			In Madras.	Of Invalids.	Total.	Admitted.	Died.	
23rd Brigade, R. A.	767	1,231	11	2	13	1,605·0	16·94	A Battery, Bangalore .. } C ,, Trichinopoly } 12 months. D ,, Secunderabad E ,, on passage, ½ month; Penang, 11½ months.
Total Royal Artillery ..	2,822	4,332	55	5	60	1,535·1	21·26	
INFANTRY.								
1st Foot, 1st Battalion	774	1,306	18	2	20	1,687·4	25·84	Kamptee, 12 months.
10th ,, 2nd ,, ...	958	586	15	..	15	611·7	15·66	Bangalore, 12 months.
18th ,, 1st ,, ...	77	63	4	..	4	818·2	51·95	Secunderabad and en route to embark, 2 months.
19th ,, 2nd ,, ...	840	1,115	17	2	19	1,327·4	22·62	Tonghoo and Thayetmyo, 12 months.
21st ,, 2nd ,, ...	858	1,177	23	3	26	1,371·8	30·30	On march, ½ month; Secunderabad, 11½ months.
24th ,, 2nd ,, ...	779	1,584	19	..	19	2,033·4	24·39	Rangoon, 12 months.
60th ,, 3rd ,, ...	599	1,146	13	3	16	1,913·2	26·71	Madras, 12 months.
76th ,, ...	782	1,381	8	2	10	1,766·0	12·79	On March, ½ month; Bellary, 11½ months.
102nd ,, ...	869	1,088	13	2	15	1,252·0	17·26	Cannanore, 12 months; Detachments at Malleopooram, Calicut, and Trichinopoly.
105th ,, ...	53	91	3	..	3	1,717·0	56·47	Wellington and en route to Bengal, 1 month.
108th ,, ...	886	1,278	26	2	28	1,442·4	31·60	Trimulgherry, 12 months.
Total Infantry	7,475	10,815	159	16	175	1,446·9	23·41	

The ratio of admissions was lowest in the Infantry; there was but a slight difference between the Cavalry and Royal Artillery. The mortality was lowest in the Royal Artillery, and highest in the Cavalry. Of the corps which served in the Command during the whole year, the 18th Hussars at Secunderabad furnished the highest ratio both of admissions and deaths. In the Infantry the highest ratio of mortality occurred also at Secunderabad in the 2nd Battalion 21st Regiment, but the admissions into hospital were most numerous in the 2nd Battalion 24th Regiment at Rangoon. The 2nd Battalion 10th Regiment again furnished, as in 1865, the lowest proportion of admissions, and with the exception of the 76th Regiment, also the lowest ratio of deaths. The Brigades of Artillery are too much subdivided to offer a fair basis of comparison. *Madras.*

SANITARY REPORT.

Deputy Inspector-General Dr. Inglis, C.B., writes, in his Sanitary Report for 1866:—

I regret to state that, though sickness and mortality have not been unduly influenced by the serious invasion of epidemic disease, the contrast of the period under report with former years, particularly 1862, 1863, and 1864, is rather unfavourable, but it closely approximates that of its predecessor.

This may be ascribed in some measure to adverse meteorological conditions. The periodical rain-fall throughout the Command was scanty and irregular, and seriously affected the food supply of the people.

Again, the death-rate of the Command was affected in a disproportionate degree by agencies operating on the health of the troops at Secunderabad, the admissions and mortality in that portion of the Command alone being very high, while that of the remainder was generally so moderate that had Secunderabad been proportionately healthy, the statistics of the Command would have approximated those of 1864.

The proportion of invaliding for the whole British force in the Madras Presidency was 56·68 per 1,000 of strength. The classes of disease influencing invaliding were, in largest proportion, diseases of the liver; next, affections of the circulation, dysentery, and ailments derived from erotic sources, in pretty equal proportion; rheumatic affections, separated as much as possible from chronic syphilitic ailments, and asthenia, furnished the subjects next most numerous, and included the cases chiefly of old, debilitated soldiers, approaching the completion of their service, and involving, in most instances, men of prolonged residence in India. The effects of attacks of periodic fever in young soldiers chiefly, with affections of the chest, bring up the list. While the average mortality rate of the Madras Command can bear favourable comparison with the sister presidencies, the rate of invaliding for some years back appears to have exceeded both. It is difficult to account for this, and a solution of the contrast can be only arrived at by those who have an opportunity of carefully comparing the vital statistics of the three presidencies.

By the conversion of all the public buildings at Wellington, in the Neilgherries, to sanitary purposes, consequent on the removal of the battalion formerly quartered there, and by making free use of that fine climate for a larger proportion of convalescents, suitably selected, it was anticipated that a sensible decrease in invaliding would immediately result. The experience of 1866 has not, however, supported this hypothesis, for the rate now recorded exceeds the average of the last seven years. If we consider, however, the specialty of the ailments for which the mass of invalids were sent home, it will cease to create surprise that the necessity for invaliding so many men should have existed. It will be discovered by a reference to the causes of invaliding, that the conditions recorded in the medical histories which accompanied the men to England, are such as experience has proved to become aggravated by residence in the more elevated Indian regions; and when structure becomes affected, change home is the only alternative. It may be asked, then, to what extent is the hill climate beneficial? The reply will be, only for prophylactic purposes, viz., to aid convalescence from fever, and all debilitating ailments, not involving structural derangement, and for conservative purposes in forti-

Madras. fying the constitutions of young soldiers likely to be deteriorated by exposure to the prolonged effects of high temperature. Under this view of the benefit to be derived from so fine a sanitarium, it may reasonably be inferred that its advantages are more prospective than immediate, and it is scarcely time yet to look for decided results, it being in reference to the young soldiers, who are so freely sent up now, that a diminution of the future rate of invaliding is to be expected. The statistics of health of the commissioned ranks fall, in regard to mortality, considerably below the non-commissioned and rank and file of the Army, but not to the extent that might be anticipated with reference to reasons that may readily be inferred.

The larger bodies of troops marching during the year were singularly healthy and free from outbreaks of cholera and disease generally.

Those movements involving a body of British troops, through a country frequently the habitat of cholera, and in several districts malarious, with such perfect success in reference to health, reflects great credit on the authorities, both staff and regimental; the former in reference to organization, and the precautions before marching, and the latter, in so judiciously carrying out instructions. The means adapted by Medical Officers in charge, as regards the prevention of disease, by selection of camping grounds, and avoidance of suspicious localities, as well as the scientific examination of water for drinking and culinary purposes, inspection of food and raiment, recorded in the daily sanitary reports, bear ample evidence of the zeal and vigilance displayed by the responsible Medical Officers in carrying out duties of such moment. Against the success of the movement of such large bodies of troops in the proper season, may be mentioned the hazard attending a departure from this rule. A small body of convalescents, left by the 21st Foot at Ramandroog, the sanitarium near Bellary, were sent *viâ* Kurnool, to join the regiment at Secunderabad, during the month of August. On arrival at Kurnool, *en route*, cholera seized the party, resulting in the loss of three lives at that station.

Secunderabad stands pre-eminent in respect of unhealthiness, furnishing, with its tributary cantonment, Trimulgherry, nearly a third of the mortality of the whole Command, and most materially augmenting the general average. It is true, at some other stations the actual rates have exceeded those of the Hyderabad force, but the reason can be easily explained. Poonamallee, for instance, is a depôt for invalids, though, in my opinion, most unsuitable in every respect for such a purpose, both in regard to climate and accommodation; at all events, statistics of health of the troops there, considering their constitution (being generally invalids waiting embarkation, and collected from other stations), cannot be taken as a fair indication of the salubrity of that locality. Again, certain single stations, wherein small detachments of troops are quartered, show exorbitant mortality rates. Seetabuldee, for instance, and Chindawarra, which are subordinate to Kamptee, are respectively high. It may be mentioned, however, that Chindawarra is a sanitary position, and that the death-rate there was, no doubt, owing to casualties among sick sent to it from Kamptee. Again, as Seetabuldee is only within a few miles of Kamptee, and a very small post, perhaps its rates need not have been separated. Secunderabad, therefore, has proved itself more unhealthy than any other large station in the Command for the period. The 18th Hussars and 108th Foot have been chiefly affected by this exceptional mortality. The cavalry regiment occupying the old European infantry barrack at Secunderabad, and the 108th, the new lines at Trimulgherry, denominated the "Second European Infantry Barrack," both of which, for local reasons, may be considered the least healthy in this extensive cantonment. The old Infantry Barracks at Secunderabad had always a bad reputation, attributable as much to overcrowding in former times as to the evident insalubrity of the position, so often described. These barracks, however, owing probably to improvements in ventilation, better conservancy, and vastly diminished occupation, appeared, during some portion of the time they were held by the 17th Lancers and King's Dragoon Guards, to have, in some measure, established a claim to higher sanitary attributes than formerly; for the regiments just alluded to enjoyed excellent health, one after the other, when stationed at Secunderabad. This has, in some measure, been reversed in the case of the 18th Hussars, whose individual mortality, during

the year they have been in possession of these lines, has been 51·88 per mille. This unhealthiness has been attributed, by the Medical Officer in charge, to what he describes as the well-known insalubrity of the barracks and their vicinity, and other causes not so apparent, inasmuch as they affect more or less all the troops, viz., alleged inferiority in quality of food, bedding, &c. The drinking water is specially charged as having exercised an injurious agency on health. There is no doubt, however, notwithstanding the comparatively favourable statistics of the 17th Lancers and King's Dragoon Guards when stationed at Secunderabad, the position of barracks and other buildings are both radically bad. I have alluded to the 108th Foot as also having a heavy sick and mortality list. This regiment was quartered in the 2nd European Infantry lines at Trimulgherry, and although under more favourable general sanitary auspices than the 18th Hussars, its mortality rate has been very high. In accounting for this, the Medical Officer in charge describes the year as having been exceptionally trying, much sickness having prevailed, while the proportion of deaths was greatly increased by the occurrence of cholera of a very virulent type, but luckily circumscribed in its extent. He also alludes to the low undrained marshy land surrounding the lower end of the lines of his regiment, and which, if left undrained and uncultivated, will always prove a source of disease. The diseases which have so seriously affected the troops in and about Secunderabad have been chiefly of the miasmatic and malarial order of the zymotic class, viz., dysentery, diarrhœa, and fevers, with venereal and hepatic disorders. Guineaworm, though disappearing, influenced admissions to hospital in the 108th Regiment very much. There was a large proportion of deaths from cholera throughout the Hyderabad force, and out of 17 seizures, 14 British soldiers succumbed to attack, indicating, as alluded to by the Surgeon of the 108th Foot, a virulence of type. By cholera the 108th lost five men of six attacked; the 2nd Battalion 21st Regiment four in five; 18th Hussars, three men were attacked, and all died. Among the Royal Artillery,—including one battery, Royal Horse Artillery, two field, and one garrison battery,—there were only three attacks, with two deaths. Of the deaths by cholera in the 21st Fusiliers, it may be remembered as already noted that three occurred at Kurnoul in a small party marching from Ramandroug to Secunderabad in August. *Madras.*

I have extended my remarks in reference to the large portion of the British element of the Madras Army, forming a constituent of the Hyderabad Command, to show how much that section of the force has influenced the health-statistics of the whole, and the causes which appear to have so unsatisfactorily deteriorated its comparative sanitary condition.

In his general conclusion, in reference to the health of the Royal Artillery at Secunderabad, the Medical Officer in charge hopes that the Battery of Royal Horse Artillery, now quartered in Secunderabad, will soon be removed to the new blocks in progress of completion for it in Upper Trimulgherry. This result is greatly to be desired; for, notwithstanding that the site of the Begumpett Barracks is good, the temporary blocks occupied by the battery are most faulty in construction, and their position is surrounded by filthy bazaars, sweltering paddy fields, and half fœtid tanks. To prevent overcrowding in this position, a field battery was removed from Secunderabad last year. The erection of new barracks in the more elevated ground beyond Trimulgherry for a regiment of British cavalry,—the better drainage of the station in general, especially the lower Trimulgherry lines,—the interdiction of patches of rice cultivation abutting on cantonment lands,—and the removal of several villages inhabited by low caste natives, who cultivate the paddy fields referred to,—are absolutely necessary towards the establishment of more favourable health-statistics of the British troops quartered in this fine cantonment.

Among other suggestions likely to exercise a beneficial influence on health, it has been proposed by the Surgeon of the 2nd Battalion 21st Fusiliers, to modify the existing rules regarding the system of musketry practice, in which he appears to be supported by the opinion of his Commanding Officer. Dr. Stewart considers the hours for ball practice are unsuited to the climate, and that the daily course itself might be materially shortened, and consequently the risk of insolation, by the men being kept out and marched

Madras. home when the sun is becoming vertical, diminished. He is of opinion, and I think with justice, that by using two pairs of ranges, as formerly carried out in this country, firing could be got over by 7·30 or 8 A.M. at the latest. This Medical Officer shows in a tabular statement attached to his Medical Report, that a company with the casuals attached, cannot perform the firing at two ranges in two hours and a half at one time, the result, with the time occupied in examining the hits, being that the men cannot get back to barracks before the sun is high, viz., 9 A.M. On the other hand, when permission had been previously granted—when the regiment was stationed at Bellary—for four ranges to be used, the result was, the men never suffered from exposure to the effects of the sun, the musketry instruction being quickly and efficiently performed, while the men took greater interest in their work. Insolation is of common occurrence during the hot months in the Deccan, and unnecessary fatigue with exposure at that season should be scrupulously avoided.

The Surgeon of the 108th Foot, besides the insanitary causes he notes as having deteriorated the health of his regiment, ascribes also a great deal to the inferior physique and indifferent selection of the young soldiers of his regiment.

As a contrast to the high rates of sickness and mortality which distinguished Secunderabad and Trimulgherry, statistics of the troops stationed at Bangalore, the next largest European station in the Command, bear sufficient evidence of the high standard of health they enjoyed in the salubrious climate of this delightful cantonment.

The statistical returns exhibiting the admissions, deaths, and invaliding, considered collectively, entitle Bangalore to pre-eminence as a station for European troops, and while its central position—being equally easy of access by railway from both of the Indian seas—proclaims its pretensions to the highest importance as a military post, its fine and elevated climate afford it hygienic advantages that no other station on the plains or tablelands of India possesses. The public works alluded to in my last report as on hand at Bangalore have not made much progress towards completion. The new barrack buildings on the old race course, to be occupied hereafter by the regiment of British cavalry and two batteries of artillery, are not all yet in a sufficiently advanced state for their destined tenants, and the model hospital which is to supersede the old and badly-arranged buildings, is still in such a condition that it is beyond my power to speculate about the time it will be ready to receive the sick. No system of drainage, so far as my information serves me, has yet been approved of for the new military works at Bangalore, and it will be of the utmost importance for sanitary reasons to provide for this before the troops move in.

The works for improving the water supply to the troops at Bangalore are also unfinished, and as a consequence the erection of plunge and swimming-baths is postponed. I have at various times advocated the removal of the depôt at Poonamallee to this station, and need not reiterate the special reasons submitted in support of my proposition. These are still unchanged, the principal one being the liability to overcrowding at certain seasons, owing to the inadequate and inferior accommodation afforded by the wretched old barracks at the depôt. To obviate risk from the cause described as well as from the apparent growing insolabrity of Poonamallee, as evidenced by choleraic outbreaks among the Eurasian and native population grouping round the military boundaries, and the extension of the disease in a sporadic form among the people of the depôt, it was recommended and approved of, that all invalids from the ceded districts, with those who pass medical boards at Bangalore, should be detained at the latter station till required for embarkation, when they could be easily deported to Madras in a few hours by railway. By this means Bangalore will be, to a certain extent, made use of for a purpose, for which its capabilities and climate render it so eligible, and the necessity for overcrowding the barracks at Poonamallee, described by Dr. Macpherson, the Officiating Sanitary Commissioner for Madras, as the "worst occupied by British soldiers in India," at seasons immediately anterior to embarkation of the invalids for England, will be avoided.

I have alluded to the occurrence of a few cases of cholera in the Poonamallee Depôt in the month of June. This outbreak was confined, with one exception, entirely to the women and children, among whom, out of nine

seizures, five died. In support of my convictions of the ineligibility of Poonamallee as a depôt for military invalids, I need only allude to a letter to the Madras Government from the Sanitary Commissioner. The Hon. Mr. Ellis, C.B., in reference to the inferior nature of the accommodation and liability to periodic overcrowding at the depôt, mentions "that there is constant danger to the health of the soldiers stationed at Poonamallee" and alludes to the fact that cholera was becoming very prevalent among the native population, and had appeared in a sporadic form in the hospital. Mr. Ellis submitted some very practical proposals for improving the accommodation and sanitary arrangements, including the adaptation and reconstruction of the latrines for the dry earth system, pending the removal of the depôt to new barracks proposed to be erected in the neighbourhood of Palaveram, and many improvements of a temporary nature have been sanctioned by Government. Could, however, the old Infantry Barracks at Bangalore be capable of conversion for the accommodation of the invalids, the necessity for erecting costly blocks in an inferior climate, with all the improbability of their completion within a reasonable period, would be averted. I am afraid, however, there is no chance now for the establishment of the invalid depôt at Bangalore, for it appears to be settled, on being vacated by the companies of infantry now in them, that the old barracks will be handed over for commissariat purposes; indeed a large new block for a bakery is already considerably advanced in the very centre of the barrack square. Another subject involving a sanitary question was in connection with a proposal to abandon Moothoor, in the central provinces, as a sanitarium, owing to the enlargement of Wellington, with its finer climate and increased accessibility from Kamptee by railway and steamer down the western coast. It was therefore resolved by Government, as Moothoor was considered ill-adapted for a sanitarium, that the further erection of buildings should be stopped there, and that Chindwarra should be retained solely as a sanitarium for the troops located at Kamptee. Among other sanitary questions worthy of record, it may be mentioned that a committee was appointed by Government, of which the writer was a member, to report on a question which originated in a proposition by the surgeon of the 1st King's Dragoon Guards to substitute arrack for porter on the line of march, for the obvious reasons that it can be more easily carried than malt liquor, which requires an immense amount of carriage, involving much additional expense to the State, and the risk of deterioration by jolting. After weighing the opinions of officers commanding British regiments, with those of the medical officers in charge, the Committee were unanimously of opinion that the change suggested would be retrogressive, and in direct opposition to the recommendation of the Royal Commission. It was also suggested by the Bangalore Committee to Government, that by placing the cheap wines of France and South Africa in the canteens, a taste might be created for their consumption, which in time might annihilate the present craving for ardent spirits. *Madras*

I mentioned in my last year's report, in reference to bedding, that the cotton quilt and common wood trestle were then in use. The cotton quilt has been condemned, and the soldiers have now two good English blankets each. Iron cots for barracks have been sanctioned. When issued, however, something must be definitely determined on in the way of permanent bedding, as that now in use cannot be comfortably adapted to iron cots. I am still of opinion that coir mattresses, such as are now universally adopted for the hospitals, will be also found more suitable for barracks in this country. As a substance the cocoa-nut fibre can be at any time removed from its palliasse, and dusted, teazed like horse-hair, or even washed, and when dry, replaced and made as useful as formerly. Being a staple of the country, and capable of production to any amount, it should be as a material most economical, while trial in every way proves that it forms a most comfortable bed.

The question about a separate hospital for the regiment at Fort St. George was raised in August of the year under report, which would indicate that objection to the association of military sick, with such discordant elements as form the inmates of the great collective civil and military hospital of Madras, has been fully recognized. The writer also was a member of the Committee formed for the selection of a site for this purpose. To render the site proposed more eligible, however, in its sanitary aspect, thorough drainage is

Madras. necessary, and a recommendation was also submitted for the removal of the graveyard, which also is in too close proximity to the general hospital alluded to. No doubt there exist better positions than that mentioned above, but for reasons considered, each had some special objection to it urged, involving either distance or some matter of military moment. The question regarding the site for the future regimental hospital has, however, been deferred. Meanwhile the eastern wing of the great hospital is rapidly approaching completion, and within a short time the British sick will be moved into it. This wing will afford better means of segregation of the military sick, and will be more eligible also in a sanitary point of view, being better exposed to the prevailing sea breeze.

In reference to gymnasia for the troops in the Madras Command, matters are to the best of my knowledge in much the same condition they were when noticed in my last sanitary report. I can add nothing to what I have said before on the importance of such institutions.

In my last report I alluded to the water supply throughout the Presidency, chiefly with reference to Madras. It was proposed to filter the water of the seven wells, the source from whence the supply for the troops is obtained; but a scheme of greater value is before Government, which, if carried out, will be of the greatest benefit to the general community of Madras as well as the troops. I allude to a project for bringing pure water from the Red Hills, a few miles distant.

I alluded in my last report to the orders issued in regard to cholera camps throughout the Command. It may now be stated that all such harbours of refuge, in event of invasion of pestilence, have been selected in eligible sites with reference to water supply, segregation, and convenience.

No change regarding food for the troops has been instituted, and the quantity still remains the same. The quality of the meat ration is often complained of. This inferiority depends on circumstances chiefly dependent on the contract system, and will remain unaltered till the commissariat in India become their own purveyors, as at Aldershot and other camps at home. The competition for contracts among natives is very keen, and terms are often offered, at which carrion could scarcely be supplied. Young animals and bullocks fit for labour, or cows so long as they will breed, are never as a rule sold for slaughter, from which it may be readily inferred what is the description of beef usually supplied to the troops throughout the land. Many propositions have been made for improvements in quality, such as a stall feeding a short time before slaughtering. This suggestion would be *à propos*, provided the age of the animals was not generally so advanced that improvement in condition becomes hopeless. The only alternative therefore appears to be for grazing farms to be maintained, and young stock raised so that Government may ultimately become independent of contracts for this the most important element of the food supply of the troops. Complaints are occasionally made regarding the monotony as well as the insufficiency of the ration. These are chiefly from Burmah where beef is the perpetual supply of animal food, occasionally varied by a ration of pork, seldom mutton, which, as a rule, is only issued to the sick in hospital. Sheep are most difficult to rear in Burmah, owing to the excessive moisture of the climate for a great part of the year. Indeed it has been calculated that to supply mutton in fair proportion to relieve monotony in diet at the two frontier stations of Thyetmyoo and Songhoo, would cost Government a rupee a pound, or, in other words, 2*s.* a single meat ration per man! The want of potatoes is also a deprivation soldiers severely feel in that province, no other vegetable allowed, in whatever proportion, making up for this want.

The present term of service in Burmah averages, I believe, five years, which, combined with the monotony in food described, and the *ennui* men seem predisposed to by the climate, renders it a most unpopular station for troops. This feeling is not peculiar to the British soldier, his Indian *confrère*, the sepoy, shows it with him, and so much so, that Government was obliged to limit the service for native troops in the Pegu Division to three years, and the men leave their families in India, in the certain hope of getting back at the expiration of that period. Why should the British soldier not be treated with equal liberality? The reasons appear equally urgent, and if it is owing to a question of financial expediency that the exception is made, its soundness has to be

proved. I consider on hygienic and moral grounds, that three years service in Burmah for British troops should not be exceeded. *Madras.*

Altogether during the first quarter deaths from diseases of the miasmatic order, of the circulation, and digestive organs (chiefly hepatic) were very high. The second quarter, according to the death rate, was the healthiest of the year. Cholera prevailed to a very slight extent at Trichinopoly in April, but, on the whole, April and May were healthy months as regards ordinary causes of sickness. The unusual and comparatively high rate of temperature which seems to have commenced throughout India this hot season towards the end of the quarter was beginning to be severely felt, and several deaths occurred from insulation. As the sun's action became more intense in the third quarter, deaths by this cause were more common, and with dysentery and other miasmatic disorders and hepatic disease, the maximum mortality compared with corresponding periods was arrived at. It was in June of this year that cholera prevailed at Poonamallee, chiefly among the women and children, only one soldier having died. Secunderabad, during the period in question, was very unhealthy, and it was at this station that the majority of the deaths occurred. It may be observed that at Bangalore, in the 16th Lancers, there appeared a proclivity to dysenteric and hepatic complications at this season, which did not prevail among the other troops there. It is possible, as hinted at by the Medical Officer in charge, that this was connected with some unobserved sanitary defects, or, perhaps, the duties of the regiment may have influenced it in some measure. The appearance of cholera in Fort St. George rendered it necessary to move No. 6 Battery R. A., to Palaveram, but no death occurred. There was an improvement in the health statistics of the troops during the three last months of the year, compared with foregoing periods

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III. Bombay.

STATISTICAL REPORT.

The average strength of the European troops stationed in the Bombay Command during the year was 12,077; the admissions into hospital were 16,259, and the deaths 182, including 28 among invalids on their passage home, or at Netley while awaiting their discharge. These numbers give the proportion of 1,346 admissions, and 15·06 deaths per 1,000 of mean strength, both much under the average, and the deaths especially showing a great reduction upon the results of the preceding year. *Bombay.*

The diseases by which the admissions and deaths in 1866 were caused are stated in Abstract No. XXVIII. of Appendix. The classified results for that period, and the average of the preceding six years are shown in the following Table :—

Bombay.

Order.	Diseases.	1866. Strength, 12,077. Admissions.	Deaths. In India.	Deaths. Of Invalids.	Deaths. Total.	1866. Ratio per 1,000. Admitted.	1866. Ratio per 1,000. Died.	1860–65. Ratio per 1,000. Admitted.	1860–65. Ratio per 1,000. Died.
	Class I.								
1	Miasmatic Diseases ..	8,148	50	5	55	674·7	4·56	893·1	13·45
2	Enthetic „ ..	2,495	2	1	3	206·6	·25	272·5	·29
3	Dietic „ ..	218	3	..	3	18·0	·25	20·1	·17
4	Parasitic „ ..	136	..	..	..	11·3	..	11·3	..
	Class II.								
1	Diathetic Diseases ..	130	..	..	..	10·8	..	9·4	·25
2	Tubercular „ ..	132	22	15	37	10·9	3·07	10·1	1·88
	Class III. Diseases of the—								
1	Nervous System ..	386	11	1	12	32·0	·99	33·7	1·50
2	Circulatory „ ..	121	6	2	8	10·0	·66	13·3	·82
3	Respiratory „ ..	566	8	..	8	46·9	·66	49·3	·90
4	Digestive „ ..	1,233	23	2	25	102·1	2·07	120·0	3·43
5	Urinary „ ..	36	2	1	3	3·0	·25	2·6	·06
6	Reproductive „ ..	187	..	..	..	15·5	..	11·3	..
7	Locomotive „ ..	56	1	..	1	4·6	·08	5·1	..
8	Integumentary „ ..	1,074	..	..	..	88·9	..	99·3	·12
	Class IV.								
4	Diseases of Nutrition.	129	1	..	1	10·7	·08	5·0	·16
	Class V.								
1	Accidents	1,184	16	..	16	98·0	1·32	95·0	1·62
3	Homicide	..	1	..	1	..	·08	..	·06
4	Suicide	..	8	..	8	..	·66	·1	·37
5	Execution	..	1	..	1	..	..	..	·01
6	Corporal Punishment	28	..	..	..	2·3	·08	1·5	..
	Diseases not specified	..	..	..	..	..	..	·9	·12
	Total	16,259	154	28	182	1346·3	15·06	1653·6	25·21

The reduction in the deaths has taken place chiefly in Miasmatic diseases, and that in the admissions in Miasmatic and Venereal diseases.

Miasmatic Diseases when subdivided, give the following results:—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Strength. 1866. Admitted.	1866. Died.	1860–65. Admitted.	1860–65. Died.
Eruptive Fevers	2	..	·2	..	2·1	·25
Paroxysmal „	4,101	9	339·6	·75	501·6	5·90
Continued „	1,099	16	91·0	1·32	98·0	1·11
Dysentery and Diarrhœa	1,409	14	116·7	1·16	137·0	3·36
Spasmodic Cholera..	11	8	·9	·66	9·8	6·08
Sorethroat and Influenza	297	..	24·6	..	19·9	·01
Ophthalmia	528	..	43·7	..	52·9	..
Rheumatism.	604	2	50·0	·17	63·0	..

Eruptive Fevers.—Under this head two cases of measles are entered. There were no admissions by small pox. *Bombay.*

Paroxysmal Fevers were slightly lower than in 1865, and nearly one-third under the average of the six years 1859-65. The deaths amounted to scarcely one-third of the proportion in 1865, or one-eighth of the average. *Continued Fevers* were a little below the average.

Dysentery and Diarrhœa were much lower than in the preceding year. The reduction in the mortality was chiefly in cases of dysentery.

Spasmodic Cholera did not prevail in an epidemic form except at Poona where in September it broke out in a company of the 96th Regiment occupying an old condemned barrack in the General Depôt Lines. The company was moved into camp and the disease ceased; seven cases occurred in it of which six terminated fatally. The other two deaths by this disease were in the Royal Horse Artillery at Kirkee and in the 33rd Regiment *en route* from Deesa to Poona in November. There was a very marked exemption from sporadic cases of cholera among the troops throughout the year.

Ophthalmia continues to show a satisfactory decrease. The 95th Regiment still had a much higher proportion of cases than any other corps in the Command.

Enthetic Diseases, though much under the average, were more prevalent than in 1865, the difference being shown in cases of syphilis.

Tubercular Diseases.—The ratio of mortality by this class of diseases was higher than in 1865, and considerably above the average of the six years. The difference, however, there is reason to believe, is the result of more correct diagnosis, and greater care in reporting the actual cause of death, and not of an actual increase in the mortality by consumption. If the mortality by tubercular diseases and those of the respiratory system be combined, the ratio of mortality will be found to be 5·14 for 1866, 5·72 for 1865, and 5·31 for the average of the six years.

Accidental and Violent Deaths.—The most frequent cause of death in this class has been sunstroke or heat apoplexy, of which there were 19 cases and 9 deaths; the latter, however, was only half the number which occurred in 1865.

The sickness and mortality in the different military divisions of the Bombay Presidency are shown in the following Table:—

Bombay.

Military Divisions.	Stations.	Average Annual Strength.	Admitted into Hospital.	Died in India.	Ratio per 1,000. Admitted.	Died.
Presidency	Colaba	438	386	6	881·3	13·70
	Khandalla (General Depôt)	64	108	4	1,687·5	62·50
Poona ..	Poona..	2,218	3,811	33	1,718·2	14·88
	Sattara.	230	281	1	1,221·8	4·35
	Ahmednuggur ..	530	683	6	1,288·7	11·32
	Asseerghur . ..	98	100	1	1,020·4	10·20
	Belgaum	1,026	1,235	10	1,203·7	9·75
	Kirkee	468	848	5	1,812·0	10·68
	Sholapoor	132	192	1	1,454·6	7·57
	Manderdeo ..	176	126	..	715·9	..
Mhow ..	Mhow	1,414	2,249	11	1,590·5	7·78
	Indore	85	90	..	1,058·8	..
	Neemuch	288	615	5	2,135·4	17·36
	Nusseerabad ..	965	1,306	6	1,353·4	6·22
	Ajmere.	54	65	..	1,203·7	..
Northern ..	Deesa..	810	1,140	11	1,407·4	13·58
	Ahmedabad. ..	272	403	2	1,481·6	7·35
	Mount Aboo* ..	117	203	2	1,735·1	17·94
	Baroda.	24	20	..	833·3	..
Scinde ..	Kurrachee	968	1,060	3	1,095·1	3·10
	Hydrabad	396	341	12	861·1	30·30
	Aden	668	613	10	917·7	14·97
	Sanitaria & Invalids ..	..	871†	20	..	..
	On the March, &c.	296	250	4	844·6	13·51

* Some remarks on the fever met with at Mount Aboo will be found in the Appendix, page 493.

† Chiefly re-admissions already accounted for as admissions at other stations.

Neemuch continues to furnish the highest proportion of cases of all the stations. With the exception of Khandalla, where the numbers are very small, the ratio of deaths has been highest at Hydrabad; at none of the other stations was it so high as to call for remark.

The sickness and mortality by the different classes of diseases in each of the military divisions is shown in the following Table :—

Order.	Military Divisions	Presidency.		Poona.		Mhow.		Northern.		Scinde.		Aden.		Troops on March		Presidency.		Poona.		Mhow.		Northern.		Scinde.		Aden.		Troops on March.	
	Average Annual Strength	502		4,878		2,807		1,222		1,364		668		296		Annual Ratio per 1,000 of Strength.											
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.																										
1	Miasmatic Diseases ...	257	2	3651	25	2262	6	949	5	653	3	211	3	132	2	512·0	3·98	748·5	5·13	805·9	2·14	776·6	4·09	478·7	2·20	315·9	4·49	446·0	6·75
2	Enthetic ,, ...	52	1	1151	...	652	...	228	1	229	...	115	1	26	...	103·6	1·99	236·0	...	232·3	...	186·6	·82	167·9	...	172·2	1·50	87·9	...
3	Dietic ,, ...	6	...	94	2	55	...	9	1	34	...	13	...	1	...	12·0	...	19·3	·41	19·6	...	7·4	·82	24·9	...	19·5	...	3·4	...
4	Parasitic ,, ...	...	...	62	...	36	...	19	...	16	...	4	...	...	...	...	...	12·7	...	12·8	...	15·5	...	11·7	...	6·0	...	...	...
	Class II.																										
1	Diathetic Diseases ...	7	...	45	...	38	...	9	...	17	...	14	...	4	...	13·9	...	9·2	...	13·5	...	7·4	...	12·5	...	21·0	...	13·5	...
2	Tubercular ,, ...	8	2	39	5	21	3	21	2	10	1	4	...	3	...	15·9	3·98	8·0	1·02	7·5	1·07	17·2	1·63	7·3	·73	6·0	...	10·1	...
	Class III.																										
	Diseases of the—																										
1	Nervous System ...	12	...	135	4	93	4	71	1	38	1	25	...	3	...	23·9	...	27·7	·81	33·1	1·42	58·1	·82	27·9	·73	37·4	...	10·1	...
2	Circulatory ,, ...	2	...	84	1	22	1	2	1	3	1	5	...	1	1	4·0	...	17·2	·21	7·8	·36	1·6	·82	2·2	·73	7·5	...	3·4	3·38
3	Respiratory ,, ...	19	1	299	2	116	2	49	...	69	1	34	...	10	1	37·8	1·99	61·3	·41	41·3	·71	40·1	...	50·6	·73	50·9	...	33·8	3·38
4	Digestive ,, ...	42	2	581	9	322	4	91	1	89	1	57	1	8	...	83·7	3·98	119·1	1·84	114·7	1·42	74·5	·82	65·2	·73	85·3	1·50	27·0	...
5	Urinary ,, ...	1	...	12	1	9	...	4	1	5	...	3	...	...	...	2·0	...	2·4	·21	3·2	...	3·3	·82	3·7	...	4·5	...	...	...
6	Reproductive ,, ...	9	...	96	...	50	...	9	...	21	...	8	...	1	...	17·9	...	19·7	...	17·8	...	7·4	...	15·4	...	12·0	...	3·4	...
7	Locomotive ,, ...	1	...	28	...	9	1	3	...	10	...	1	...	3	...	2·0	...	5·7	...	3·2	·36	2·4	...	7·3	...	1·4	...	10·1	...
8	Integumentary ,, ...	40	...	385	...	300	...	165	...	108	...	53	...	24	...	79·7	...	78·9	...	106·9	...	135·0	...	79·2	...	79·3	...	81·1	...
	Class IV.																										
4	Diseases of Nutrition ...	13	...	55	...	29	...	17	...	2	...	1	...	17	...	25·9	...	11·3	...	10·3	...	13·9	...	1·5	...	1·4	...	57·4	...
	Class V.																										
1	Accidents	21	1	545	4	305	...	120	2	95	5	63	3	17	...	41·8	1·99	111·7	·81	108·7	...	98·2	1·63	69·6	3·66	94·3	4·49	57·4	...
3	Homicide	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	·21	...	...	...	...	...	...	...	...	...	...
4	Suicide	...	1	...	2	...	1	...	...	...	2	...	2	...	...	...	1·99	...	·41	...	·36	...	...	...	1·56	...	3·00	...	...
5	Execution	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	·21	...	...	...	...	...	...	...	...	...	...
6	Corporal Punishment ...	4	...	14	...	5	...	1	...	2	...	2	...	...	...	8·0	...	2·9	...	1·8	...	·8	...	1·5	...	3·0	...	...	...
	No appreciable disease ...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	·4	...	...	...	...	...	...	...	...	...
	Total	494	10	7276	57	4325	22	1767	15	1401	15	613	10	250	4	984·1	19·90	1491·6	11·68	1540·8	7·84	1446·0	12·27	1027·1	10·97	917·6	14·98	844·6	13·51

Bombay. The admissions have been lower than in 1865 in all the Divisions except Poona and Scinde, where they have been in excess of that year. The reduction has been greatest in the Presidency Division, and next to that at Aden. The mortality has been much lower than in 1865 in all the Divisions, but most markedly among the troops on the march, and at Aden and Mhow. The class of miasmatic diseases is that to which the greatest amount of the reduction is due.

MIASMATIC DISEASES.—The influence of the principal diseases comprised in this class in causing sickness and mortality among the troops is shown in the following Table:—

Military Divisions ...	Presidency.		Poona.		Mhow.		Northern.		Scinde.		Aden.		Troops on the March.		Presidency.		Poona.		Mhow.		Northern.		Scinde.		Aden.		Troops on the March.	
Average Annual Strength ...	502		4,702		2,807		1,222		1,364		668		296		Annual Ratio per 1,000 of Mean Strength.													
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Eruptive Fevers	1	...	...	...	1	1	...	...	...	...	...	...	...	...	2·0	...	...	...	·4	·36	...	...	...	...	...	...	...	...
Paroxysmal ,, ...	132	...	1775	4	1517	3	197	1	360	1	26	...	56	1	262·9	...	363·9	·82	540·4	1·06	161·2	·82	263·9	·73	38·9	...	189·2	3·38
Continued ,, ...	1	...	422	6	98	1	506	4	...	...	68	3	13	...	2·0	...	86·5	1·22	34·9	·36	414·1	3·27	...	...	101·8	4·49	43·9	...
Dysentery and Diarrhœa ...	81	1	798	8	251	1	104	...	77	1	86	...	27	...	161·4	1·99	163·6	1·64	89·4	·36	85·1	...	56·5	·73	128·7	...	91·2	...
Cholera Spasmodica	...	...	9	7	...	...	1	...	...	...	...	...	1	1	...	...	1·9	1·44	...	...	·8	...	...	...	...	...	3·4	3·38
Tonsillitis and Influenza ...	6	...	124	...	109	...	23	...	13	...	6	...	15	...	12·0	...	25·4	...	38·8	...	18·8	...	9·5	...	9·0	...	50·7	...
Ophthalmia	15	...	202	...	97	...	74	...	128	...	7	...	7	...	29·9	...	41·4	...	34·6	...	60·6	...	93·8	...	10·5	...	23·7	...
Rheumatism	19	1	283	1	163	...	33	...	61	...	12	...	11	...	37·8	1·99	58·0	·21	58·1	...	27·0	...	44·7	...	18·0	...	37·2	...

Bombay. *Paroxysmal Fevers* were more prevalent than in 1865 in the Poona and Scinde Divisions. In the former the excess occurred chiefly at Poona in the 45th and 33rd Regiments, and in the latter at Kurrachee in the 95th Regiment. The admissions by this group in the 45th amounted to 751 in a strength of 925, or in the extremely high ratio of 812 per 1,000. This corps in the preceding year suffered to a considerable extent at Colaba from fever of the continued type, and a wing of it had also been quartered at Neemuch, where the sources of malaria abound. The 109th Regiment, which furnished a high proportion of paroxysmal fevers at Aden in 1865, a result attributed in the Report for that year to the effect of its previous service at malarious stations, had during 1866 only 62 admissions per 1,000 of the strength from these fevers.

Continued Fevers.—There was a very marked increase in the prevalence of fevers of this type in the Northern Division, but attended with a greater proportionate decrease in paroxysmal fevers. The difference was entirely in the 49th Regiment at Deesa. This corps landed from England in the end of 1865, and was sent at once to Deesa, where it performed the first year of its tour of service in India, and as was remarked in the case of the 45th Regiment in 1865, almost all the admissions by fever were of the continued, and not of the paroxysmal form.

Dysentery and Diarrhœa were much less prevalent than in 1865 in all the Military Divisions except Poona, in which there was a slight increase. The decrease in dysentery was equal to two-fifths, and in diarrhœa to one-sixth of the admissions by these diseases respectively in the preceding year. The Presidency Division was that in which the reduction was most marked.

Spasmodic Cholera can scarcely be said to have prevailed in an epidemic form during the year among the European troops. A sudden outburst of it took place in a company of the 96th Regiment, quartered in the Depôt Barrack at Poona in the month of August. Diarrhœa had been prevalent in the corps in July and August. On the 20th of the latter month the first case among the men, and on the 6th of September, the last case occurred. In all, seven were attacked and six died. Three of them were in hospital at the time, under treatment for other diseases.

Ophthalmia.—The admissions by this disease were higher than in 1865 in the Scinde Division, owing to its prevalence in the 95th Regiment at Kurrachee. The admissions in it amounted to 114, being in the ratio of 135 per 1,000 of mean strength. The Medical Officer attributes its prevalence to "a debilitated and scorbutic state of the system due to prolonged residence at places where scurvy is known to prevail, as at Aden and Scinde." This regiment also furnished the highest proportion of cases of ophthalmia in 1865; the 33rd and 45th, which in that year suffered considerably from it did not in 1866 greatly exceed the average.

Enthetic Diseases have been more prevalent than in 1865 in the Mhow Division, but have undergone a corresponding reduction at Aden. In the other divisions the difference has been trifling, and not more than might be attributed to the fluctuations arising from limited numbers.

Diseases of the Digestive System have been considerably lower than in 1865 in all the Military Divisions, but especially in the Presidency and at Aden. The reduction has not been confined to any special disease, but has extended to all the principal affections composing this class.

The admissions and deaths in each corps serving in the command in 1866 are shown in the following Table:—

Regiments.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Annual Ratio per 1,000.		Stations during the Year.
			In Bombay.	Of Invalids.	Total.	Admitted.	Died.	
CAVALRY.								
3rd Dragoon Guards	470	584	8	1	9	1242·6	19·15	Ahmednuggur, 12 months.
6th Dragoons	465	714	1	..	1	1535·5	2·15	Mhow, 11½.
11th Hussars	72	128	1	..	1	1777·7	13·89	Arrived from England, 26th October; Poona, 1; Mhow, 1; Detachment at Khandalla, 1.
Total Cavalry	1,007	1,426	10	1	11	1416·1	10·92	
ARTILLERY.								
E Brigade, R. H. A.	500	786	4	..	4	1572·0	8·00	A Battery, on the march, 1½ months; Kirkee, 10½ months. B „ Ahmednuggur, 12 months. C „ Kirkee, 12 months. D „ Mhow, 12 months.
14th Brigade, R. A.	593	783	9	2	11	1320·4	18·55	Head-Quarters and D Battery; Kirkee, 1; Dhoolia-kote, 1; Ahmedabad, 10 months. E Battery, Deesa, 12 months. F „ Nussecrabad, 12 months. G „ Sholapoor, 10½ months; en route to Hydrabad, ½ month; Hydrabad, 1 month.
18th Brigade, R. A.	851	1,271	12	2	14	1493·6	16·45	Head-Quarters and A Battery, Kurrachee, 12 months. B Battery, Ahmedabad, 12 months. C „ Hydrabad, 11; on the march, 1. D „ Neemuch, ⅓ month; on the march, 2 months; Kirkee, 9⅔ months. E „ Belgaum, 10⅔ months; en route to Sholapoor, 1 month; Sholapoor, ⅓ month. F „ Neemuch, 12 months.

Regiments.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Annual Ratio per 1,000.		Stations during the Year.
			In Bombay.	Of Invalids.	Total.	Admitted.	Died.	
ARTILLERY—*cont.*								
21st Brigade, R.A.	445	565	3	2	5	1269·7	11·24	Head-Quarters and No. 1 Battery, Mhow, 12 months. No. 2 Battery, Butcher's Island, 2 months; Kirkee, 10 months. No. 3 „ Aden, 12 months. No. 4 „ „ „ No. 5 „ Belgaum, 12 months. No. 6 „ Butcher's Island, 2; Kirkee, 9 months; on the march ⅓ month; Mhow, ⅔ month.
Sappers and Miners..	15	11	..	..	..	733·3	..	Poona, 8 months; Manderdeo, 4 months.
Total Ordnance Corps.. ..	2,404	3,416	28	6	34	1,421·0	14·14	
INFANTRY.								
2nd Battalion, 1st Foot	30	47	1	..	1	1,566·7	33·33	Left Wing, arrived from England 17th Nov.; on the march 1½ months. Right Wing, arrived from England 27th December.
1st „ 2nd „	132	162	3	..	3	1,227·3	22·73	Arrived from England 22nd October; Aden, 2 months; Detachment at Hydrabad.
1st „ 4th „	825	858	13	2	15	1,040·0	18·18	Head-Quarters, Colaba, 12 months; Detachments, Sattara, 12 months; Khandalla, 4¼ months; Asseerghur, 7⅝ months.
1st „ 5th „	16	7	..	..	..	437·5	..	Arrived from England 17th December; Kurrachee, ¼ month.
26th Regiment	842	1,046	8	2	10	1,242·3	11·88	Belgaum, 12 months.

Regiments.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Annual Ratio per 1,000.		Stations during the Year.
			In Bombay.	Of Invalids.	Total.	Admitted.	Died.	
INFANTRY—*cont.*								
33rd Regiment	927	1,454	5	6	11	1,568·5	11·87	Poona, 11½ months; Kurrachee, ½ month; Detachment at Neemuch, 12 months.
45th „	926	1,689	14	1	15	1,824·0	16·20	Poona, 12 months.
49th „	830	1,227	13	..	13	1,478·3	15·66	On the march, ½ month; Deesa, 11½; Detachment at Mt. Aboo, 10 months.
95th „	845	846	5	..	5	1,001·2	5·92	Kurrachee, 12 months.
96th „	628	909	16	1	17	1,447·5	27·07	Poona, 8 months; Manderdeo, 4 months.
103rd „	896	1,260	12	4	16	1,406·3	17·86	Mhow, 12 months.
106th „	946	1,233	6	2	8	1,303·4	8·46	Nusseerabad, 12 months; Detachment at Ajmere.
109th „	837	678	20	3	23	810·0	27·48	Aden, 10½ months; en route to Poona, ½ month; Poona, 1 month; Detachment at Hydrabad, 9⅔ months.
Total Infantry	8,680	11,416	116	21	137	1,315·2	15·78	

Bombay. The ratio of admissions into hospital has been lowest, and of deaths highest in the infantry. The admissions of cavalry and artillery have been remarkably similar, but the proportion of deaths in the former have been considerably below that in the ordnance. The admissions have not been so much in excess in any of the corps as to call for special remark. As in the previous year, the 45th Regiment furnished the highest ratio. The lowest proportion occurred in the 109th Regiment at Aden and Hydrabad. If the regiments which were but a short time in the Command be excluded, the only two in which the mortality greatly exceeded the average were the 96th at Poona, which, as already stated, suffered from cholera, and the 109th, which lost five men by sunstroke, four by suicide, and two by fracture of skull.

SANITARY REPORT.

Extract from the Annual Report of Deputy Inspector-General Dr. Currie, of the Medical Transactions of Her Majesty's British Forces serving in the Bombay Command, for the year ending 31st December, 1866.

In my last report I mentioned that the most important sanitary improvement in barracks was the great increase of superficial and cubic space lately ordered by Government. The former has now been uniformly increased to 90 square feet, and the latter pretty generally to 1,800 feet.

In order to carry out this important measure, the permanent barrack accommodation has been largely supplemented by the construction of temporary bungalows, having a day-room in the centre, and dormitories at the ends. By these arrangements, overcrowding has now been effectually relieved.

Ventilation.—While increase of space, and more especially of floor space, has been carefully carried out, the subject of improved ventilation has received a large share of attention.

In the older barracks improvements have been effected, by converting windows into doors, providing clerestory windows, ridge and roof ventilators of different descriptions. In all barracks of recent construction, the most approved ventilating appliances have been introduced. On the whole, it may be affirmed that most of the barracks in this Presidency are now sufficiently ventilated.

In connection with improved barrack accommodation, it is right to mention that good married quarters, patcheries as they are called, have been provided everywhere. To each family two moderately-sized rooms are allotted. These quarters are not only compatible with health, but they seem to afford every comfort that a married soldier can reasonably expect; and the same favourable report may be made of the subsidiary buildings connected with them.

Hospitals have undergone an equal degree of improvement with barracks.

Baths and Lavatories.—These have likewise been considerably improved and extended during the last twelve months, and are susceptible of still further improvement.

Detached ablution-rooms form part of the subsidiary buildings of all the new barracks, whether temporary or permanent; and the interior arrangements of these consist of a lavatory in the centre portion of the building, and bath-rooms for private ablutions in the two ends.

In the older barracks, the lavatories were universally formed by merely enclosing the end of the verandah at the corner of the barrack, and scantily fitted up with a few metal basins and water-casks.

During the year, I am able to report that many of these small and objectionably-placed ablution-rooms have been abolished, and detached lavatories constructed in their stead.

Water Supply.—In connection with ablutionary arrangements, the means of water supply has an important bearing. Until water is supplied by other means than by the present system of water-carriers and carts, the supply will always be more or less inadequate. The subject of increasing the supply of

water to barracks and cantonments, and the best mode of effecting it, is one of great sanitary importance, and in this country unfortunately one of considerable practical difficulty. Plunge or swimming-baths have been constructed at most stations, but these are still insufficient in number for the requirements of a tropical climate. Water for drinking purposes is generally obtained from wells, and filtered through sand and charcoal—a simple, but, it must be confessed, an indifferent mode of purifying it. While in every British colony, filters of an improved description are supplied to barracks and hospitals by Government, in India this rude and primitive filter is the only one in use, and in a country, too, above all others, where pure water is so necessary to health, and, from the habits of the people, so difficult to procure. *Bombay.*

Drainage.—The system of drainage of Indian cantonments has not yet been improved to the extent necessary or desirable. For the most part, the drains are surface, and when the rains set in after a long dry season, these are very ineffective. Permanent drains of masonry construction should be substituted for these temporary surface-drains.

Cook Houses.—Improvements in cook-houses, rather than in cooking arrangements, have made considerable progress during the last year. The Indian barrack kitchen has heretofore been a low tile-roof building, in rear of the barracks, unprovided with furniture, or chimneys, and consequently smoky and dirty to a degree. This primitive style of cook-houses is gradually disappearing; old ones are being modernised and improved, by the simple process of raising and ventilating the roofs and building chimneys on the fire-places. A few simple articles of furniture, such as dressers, chopping-blocks, and ovens for baking have been provided.

Cess-pits are being abolished, and until iron pipes shall have been supplied, the refuse-water will continue to be received into raised iron pails, and removed daily in tank-carts.

The cooking ranges have in many instances been lowered, but the cooking utensils in use are those heretofore employed by native cooks.

Rations.—There has been no change during the year in the soldier's ration in regard to quantity, but attention continues to be directed to improving the quality of the main articles composing it.

The system of supplying the meat portion of the soldier's ration is now being changed in this Presidency, and the contract is being superseded by the system of departmental supply of beef and mutton.

The new system is only in partial operation, and a stock equal to 30 days' consumption is kept up during the fair season, and six weeks' to two months' stock in the rains.

At stations where contracts are still in force (all will be brought under departmental agency in November, 1867), the contractors are bound to keep up a stock of slaughter cattle and sheep, equal to 30 days' consumption, to provide a sufficiency of good forage and salt, and the animals have to be plentifully supplied with water. They are daily inspected by a Commissariat Sergeant, and slaughtered under his supervision. No beasts or sheep under three years of age are allowed to be slaughtered.

It is not yet time to pronounce a decided opinion upon the result of the change above mentioned, but as far as the experiment has been tried, opinion is in favour of it.

At some of the large stations, Government bakeries have been established, under European superintendence, in order to ensure a better and more uniform quality of bread.

Considerable difficulty has been experienced at some stations in the Bombay Presidency in obtaining, at all seasons of the year, a sufficient supply of vegetables. Aden, Kurrachee, and a few inland stations of limited local resources, have been supplied with potatoes from Egypt and the Mahableshwur hills; and experiments are now being made with Chollet's compressed mixed vegetables, with a view to supplement the vegetable portion of the soldier's ration.

Dietary of Prisoners.—In consequence of the marked physical deterioration of soldiers undergoing long periods of imprisonment from the effects of an insufficient dietary, Government has recently sanctioned an important improvement in the dietary of soldiers imprisoned with hard labour for more than

Bombay. four weeks. The improvement alluded to consists mainly in the allowance of meat and vegetables being increased to eight ounces daily, instead of three times a week, as heretofore.

Latrines and Urinals.—The dry earth conservancy system has now been universally adopted in this Presidency, and has proved a decided success.

As regards the latrines, the working of the system is extremely simple, dry earth is found to be an excellent deodorizer, the metal pans are made to fit closely up to the seats, earth is thrown into them from time to time, and the soil emptied into air-tight iron receptacles. These latter are placed in special conservancy carts, and carried away beyond cantonment limits morning and evening.

The latrines have been further improved by the seats being partitioned by half doors or screens, and the roofs ventilated.

Until lately urinals were almost invariably placed in the corners of barrack verandahs, and were very offensive. This objectionable arrangement has now been everywhere superseded by the construction of urinary sheds, a few yards from the barrack, and communicating therewith by a covered passage.

In these sheds four urinals, dammered iron cylinders are placed, separated by half-doors, or screens, and, as in the case of the latrines, the contents are transferred to water-tight tanks for daily removal.

The general conservancy of cantonments is, on the whole, well attended to in this Presidency, and for this purpose efficient establishments of carts and sweepers are permanently entertained.

Clothing.—The present dress of the soldier in India appears to give general satisfaction, and is well suited to the climate.

Amusements and Recreations.—The only recent improvements to note are the gradual introduction of gymnasia, and the extension of workshops, vegetable gardens, reading and refreshment-rooms.

Section II.

On the Extent of Invaliding.

India. In 1866 the number of invalids sent home from Bengal amounted to 1,674, from Madras to 645, and from Bombay to 555, being in the proportion of 47·23, 56·69, and 45·95 per 1,000 of mean strength in each Command. The number of invalids from India, who were finally discharged the service at Netley, was 1,295, or 21·98 per 1,000 of the strength.

The disabilities of the invalids sent home from each of the Presidencies, and of those finally discharged the Service at Netley, are stated in Abstract No. XXIX. of Appendix, from which the following classified Summary has been prepared :—

Order.	Disabilities of	Invalids sent home from Bengal.	Madras.	Bombay.	Invalids from India discharged the service at Netley.
	Mean Strength	35,446	11,378	12,077	58,901
	Class I.				
1	Miasmatic Diseases—				
	Paroxysmal Fevers ..	72	44	18	13
	Continued ,, ..	7	..	..	..
	Dysentery and Diarrhœa	83	71	12	37
	Sorethroat	2	..	..	..
	Ophthalmia	15	3	23	43
	Erysipelas	1	..	..	..
	Rheumatism	152	47	86	78
2	Enthetic Diseases	121	65	45	107
3	Dietic ,, ...	1	..	1	1
4	Parasitic ,, ...	1	..	1	..
	Class II.				
1	Diathetic Diseases ..	78	3	23	27
2	Tubercular ,, ...	139	48	83	142
	Class III.				
	Diseases of the—				
1	Nervous System	149	34	46	132
2	Circulatory ,, ..	134	74	47	157
3	Respiratory ,, ..	70	32	17	39
4	Digestive ,, ..	316	121	75	173
5	Urinary ,, ..	10	2	4	7
6	Reproductive ,, ..	4	10	2	19
7	Locomotive ,, ..	27	4	10	34
8	Integumentary ,, ..	21	5	6	23
	Class IV.				
4	Diseases of Nutrition ..	237	67	47	219
	Class V.				
1	Accidents	33	15	9	44
	Not specified	1	..	..	..
	Total ..	1,674	645	553	1,295
	Ratio per 1,000 of mean Strength .. 1866	47·23	56·69	45·95	21·98
	Ratio per 1,000 of mean Strength .. 1861-5	35·48	41·89	31·44	18·40

The proportion of invalids sent home has been much above the average from the three Presidencies, and the number finally discharged the service at Netley has also been above it, though in a less marked degree.

Diseases of the digestive system, chiefly hepatic inflammation, have been the chief cause of invaliding from Bengal and Madras. From Bombay, rheumatism and tubercular diseases have furnished larger numbers. Diseases of nutrition hold a prominent place among the causes of invaliding from Bengal, and of final discharge from the service at Netley. These are almost all cases of debility and generally impaired health from tropical service and long continued exposure to malarious poison. Venereal diseases also are a cause of considerable loss to the service, the number discharged the service on account of them amounting to one twelfth of the whole.

Section III.

Mean Daily Sick.

India. The average number constantly non-effective from sickness in 1866 was, in Bengal, 2,012, in Madras 787, and in Bombay 642. The following Table shows the rates calculated from these data :—

	Bengal.		Madras.		Bombay.	
	1866.	1860-65.	1866.	1860-65.	1866.	1860-65.
Ratio per 1,000 constantly Sick ..	56·76	67·26	69·17	62·47	53·16	64·07
	Days.	Days.	Days.	Days.	Days.	Days.
Average Sick Time to each Soldier	20·72	25·00	25·25	22·80	19·40	23·39
Average Duration of Cases ..	14·36	13·76	16·94	16·51	14·41	14·14

The mean daily sick and average sick time to each soldier were lower than in 1865 in Bengal and Bombay, but higher in Madras, and the duration of cases was higher in Bengal and Madras, but exactly the same as in the preceding year in Bombay. Compared with the average of the six years 1860-5 the duration of the cases has been higher in all the Presidencies, but the proportion constantly sick and the average sick time to each soldier have been lower, except in Madras.

Section IV.

On the Influence of Age on the Mortality.

The following Table, framed from Abstract No. XXX. of Appendix, shows the ages of the soldiers serving in each of the Presidencies in 1866, and the deaths at each age in quinquennial periods.

	Under 20 years.		20–24.		25–29.		30–34.		35–39.		40 and upwards.	
	Strength on 1st January.	Died during Year.	Strength on 1st January.	Died during Year.	Strength on 1st January.	Died during Year.	Strength on 1st January.	Died during Year.	Strength on 1st January.	Died during Year.	Strength on 1st January.	Died during Year.
Bengal	1,329	6	10,167	117	15,396	321	6,045	185	2,103	98	360	23
Madras	853	2	3,880	45	3,899	114	1,627	54	621	36	101	11
Bombay	777	2	2,915	33	4,440	54	2,379	36	1,157	26	230	9
Total	2,959	10	16,962	195	23,735	489	10,051	275	3,881	160	691	43
Ratio of Deaths per 1,000 of Strength ..	3·38		11·54		20·60		27·36		41·23		62·23	
Ratio of Deaths per 1,000 of Strength in— Bengal, 1862–5 Madras and Bombay, 1861–5 ..	7·11		16·19		25·64		32·03		42·78		56·34	

The reduction in the mortality has been pretty equally distributed among the men under 35. The rapid increase of mortality with the advance of age is strong proof of the injurious influence of tropical service on the constitution.

XIII. ON THE HEALTH OF TROOPS ON BOARD SHIP.

STATISTICAL REPORT.

Troops on Board Ship.

THE number of troops on board ship during the year, regarding whom returns have been received, was as follows:—

I.	Troops or drafts proceeding on foreign service	16,193
II.	Do. returning from foreign service	8,831
III.	Do. passing by sea from one colony to another, from one station in a military Command to another	11,744
IV.	Invalids and "time-expired men" returning to England	5,229

I. TROOPS PROCEEDING ON FOREIGN SERVICE.

The number of men embarked for foreign service as shown by the ship returns was 16,193; representing an average *annual* strength of 2,979. There were 1,472 cases of sickness, and 26 deaths among them, being respectively in the ratio of 494 and 8·73 per 1,000 of mean strength.

The following Table, framed from Abstract No. XXXI. of Appendix, shows the admissions and deaths by the various classes of diseases, the returns being grouped according to the stations to which the men were proceeding, on the principles explained in previous reports.

Troops on Board Ship.

Order.	Diseases.	To the Cape, Ceylon, India, and China. Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	To Mediterranean. Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	To British America. Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.
	Stations												
	Number of men Embarked	9,120				3,563				3,510			
	Average *Annual* Strength..	2,684				130				165			
	Class I.												
1	Miasmatic Diseases ..	376	1	140·0	7·83	22	..	169·2	..	10	..	60·6	..
2	Enthetic „ ..	270	1	100·6	·37	63	..	484·6	..	45	..	272·7	..
3	Dietic „ ..	24	..	8·9	..	1	..	7·7	..	..	..	..	..
4	Parasitic „ ..	55	..	20·5	..	..	..	..	..	..	..	..	..
	Class II.												
1	Diathetic Diseases ..	6	..	2·2	..	..	..	..	..	..	..	..	..
2	Tubercular „ ..	16	..	6·0	..	3	..	23·1	..	..	..	..	..
	Class III. Diseases of the—												
1	Nervous System ..	33	1	12·3	·37	2	..	15·4	..	..	..	..	..
2	Circulatory „ ..	7	1	2·6	·37	..	..	..	..	..	..	..	..
3	Respiratory „ ..	99	..	36·9	..	4	..	30·8	..	7	1	42·4	6·06
4	Digestive „ ..	76	1	28·3	·37	5	..	38·5	..	11	..	66·7	..
5	Urinary „ ..	5	..	1·9	..	..	..	..	..	1	..	6·1	..
6	Reproductive „ ..	23	..	8·6	..	2	..	15·4	..	..	..	..	..
7	Locomotive „ ..	11	..	4·1	..	..	..	..	..	..	..	..	..
8	Integumentary „ ..	147	..	54·8	..	15	..	115·3	..	17	..	103·0	..
	Class IV.												
4	Diseases of Nutrition ..	2	..	·7	..	..	..	..	..	..	..	..	..
	Class V.												
1	Accidents	85	3	31·7	1·12	14	..	107·7	..	13	..	78·8	..
6	Corporal Punishment..	1	..	·4	..	1	..	7·7	..	..	..	..	..
	Total	1236	25	460·5	10·43	132	..	1015·4	..	104	1	630·3	6·06

The mortality by miasmatic diseases was exceptionally great among the troops proceeding to India. The fatal diseases were spasmodic cholera and typhoid fever; the former on board two ships from Gravesend, the latter on board two from Ireland.

The "Windsor Castle" sailed from Gravesend for Kurrachee, on the 11th of July, with drafts chiefly of Royal Artillery. Cholera was at the time prevalent in England. It soon broke out on board, and 20 cases occurred, of which four died between the 22nd July and 18th August. There were also four deaths among the women. The "Lord Warden" sailed also from Gravesend, with drafts for Madras on the 13th September. Three days after her departure cholera broke out in a detachment of the 24th Foot, which had come from Sheffield; 14 cases occurred on board, and five soldiers, one woman and two children died between the 26th September and the 26th October. There seems every reason to believe that in both these instances the disease was brought on board by the troops, and was not due to any local cause connected with the vessel.

Of the nine deaths by fever, four took place on board the "Golden

Troops on Board Ship.

Fleece," with detachments from Portsmouth and Queenstown to Hong Kong; 20 cases of fever are reported to have occurred during the voyage, of which 14 are returned as continued, and six, with four deaths, as typhoid fevers. The first of the typhoid cases was admitted on the 20th of December, four weeks after the embarkation, and the last on the 14th of February. The cause of these cases could not be satisfactorily traced, but it was believed to be local. Three deaths by fever occurred on board the "Hornet," on the passage from Dublin to Calcutta. There were only four cases, and they did not occur till after the ship had been two months at sea. In this instance also the origin of the disease could not be traced.

As in the preceding year the ratio of cases occurring among troops proceeding to the Mediterranean was very high from the large number of venereal cases. The 87th Regiment, which embarked at Portsmouth in June, furnished an unusually large proportion.

II. Troops Returning from Foreign Service.

The number of efficient troops embarked to return to England, as shown by the ship returns, was 8,831, representing an average *annual* strength of 1,917. The cases of sickness and deaths among them on the voyage are shown in the following Table, framed from Abstract No. XXXII. of Appendix.

Stations	From India, Mauritius, and Cape.				From Australasia.				From other Stations.			
Number of Men Embarked	4,042				3,037				1,752			
Average *Annual* Strength .	1,030				786				101			
Order. Diseases.	Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.
Class I.												
1 Miasmatic Diseases ..	374	15	363·1	14·56	67	2	85·2	2·54	28	..	277·2	..
2 Enthetic „ ..	134	1	130·1	·97	19	..	24·2	..	10	..	99·0	..
3 Dietic .. „ ..	6	..	5·8	..	..	..	..	..	..	..	..	..
4 Parasitic „ ..	5	..	4·9	..	3	..	3·8	..	..	..	..	..
Class II.												
1 Diathetic Diseases ..	6	..	5·8	..	1	..	1·3	..	..	..	..	..
2 Tubercular „ ..	16	3	15·5	2·92	6	..	7·6	..	..	..	..	..
Class III. Diseases of the—												
1 Nervous System ..	15	1	14.6	·97	5	..	6·4	..	5	..	49·5	..
2 Circulatory „ ..	2	3	1.9	2·92	6	1	7·6	1·27	..	..	..	..
3 Respiratory „ ..	61	..	59·2	..	38	1	48·3	1·27	5	..	49·5	..
4 Digestive „ ..	68	11	66·0	10·67	18	..	22·9	..	1	..	9·9	..
5 Urinary „ ..	4	1	3·9	·97	..	..	..	..	..	..	..	..
6 Reproductive „ ..	13	..	12·6	..	..	..	..	..	3	..	29·7	..
7 Locomotive „ ..	8	..	7·8	..	3	..	3·8	..	1	..	9·9	..
8 Integumentary „ ..	107	..	103·9	..	36	..	45·8	..	13	..	128·7	..
Class IV.												
4 Diseases of Nutrition ..	1	..	1·0	..	1	..	1·3	..	..	..	..	..
Class V.												
1 Accidents	54	..	52·4	..	30	..	38·2	..	7	..	69·8	..
6 Corporal Punishment ..	2	..	1·9	..	1	..	1·3	..	..	..	..	..
Total	876	35	850·4	33·98	234	4	297·7	5·08	73	..	722·7	..

Troops on Board Ship.

The high rate of mortality among the troops returning from the East was due chiefly from dysentery, hepatitis, and phthisis. Cholera broke out on board of one ship only, the "Durham," conveying the 80th Regiment from Bengal to England. The corps had been quartered at Chinsurah, where cholera was prevalent. The first fatal case occurred 13 days after the embarkation of the men. There were in all seven cases and five deaths.

III. Troops proceeding from one Colony or one Station to another.

The sickness and mortality among the troops passing by sea from one foreign station to another are shown in the following Table, framed from Abstract No. XXXIII. of Appendix.

Stations	Between India, China, Mauritius, and Cape of Good Hope.				Between Gibraltar and Malta, West Indies, and British America.				Colonial Corps. Between West Indies and Western Africa.				Between Ceylon and China.			
No. of men embarked ...	2,898				5,175				3,310				361			
Average *Annual* Strength	149				277				413				23			
Order. Diseases.	Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	Admitted.	Died.	Ratio per 1,000 Admitted.	Ratio per 1,000 Died.	Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.
Class I.																
1 Miasmetic Diseases ...	57	2	382·6	13·43	31	1	111·9	3·61	169	4	409·2	9·69	34	...	1478·3	...
2 Enthetic	44	...	295·3	...	8	...	28·9	...	71	...	171·9	...	...	...	...	...
3 Dietic	2	...	13·4	...	2	...	7·2	...	7	...	17·0	...	...	...	...	...
4 Parasitic ...	...	...	...	...	1	...	3·6	...	8	...	19·4	...	2	...	87·0	...
Class II.																
1 Diathetic Diseases ...	1	...	6·7	...	...	...	...	...	...	...	...	...	2	...	87·0	...
2 Tubercular	3	1	20·1	6·71	...	...	...	...	4	1	9·7	2·42	...	...	...	...
Class III. Diseases of the—																
1 Nervous System ...	1	1	6·7	6·71	1	1	3·6	3·61	10	1	24·2	2·4	...	...	...	...
2 Circulatory	...	...	...	...	...	...	...	...	1	1	2·4	2·42	...	...	...	...
3 Respiratory	6	...	40·3	...	2	...	7·2	...	106	...	256·7	...	4	...	173·9	...
4 Digestive	3	...	20·1	...	6	...	21·7	...	35	...	84·7	...	...	...	...	...
5 Urinary	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6 Reproductive	1	...	6·7	...	3	...	10·8	...	10	...	24·2	...	...	...	...	...
7 Locomotive	2	...	13·4	...	...	...	...	...	...	...	...	...	...	...	...	...
8 Integumentary ...	24	...	161·1	...	14	...	50·5	...	63	...	152·5	...	6	...	260·8	...
Class IV.																
4 Diseases of Nutrition	...	...	...	...	4	...	14·5	...	...	...	...	...	...	...	...	...
Class V.																
1 Accidents	10	...	67·1	...	13	...	46·9	...	25	...	60·5	...	2	...	87.0	...
Total	158	4	1060·4	26·85	88	2	317·7	7·22	516	7	1249·4	16·95	50	...	2174·0	...

The high ratio of admissions by miasmatic diseases in the last group was caused by intermittent fever, dysentery and diarrhœa, and ophthalmia among the men of the Ceylon Rifles who were sent to Hong Kong. Among the white troops the highest proportion of admissions occurred in the 2nd Battalion 11th Regiment, on its passage from Hong Kong to the Cape of Good Hope; the most prevalent disease being diarrhœa.

IV. Invalids, &c., Returning to England.

In the ship returns 5,229 men, representing an average *annual* strength of 1,413, are accounted for, who embarked chiefly as invalids, but a few also as "time-expired" men. Of these 1,773 men embarked sick, and 1,239 cases occurred during the voyage. There were 193 deaths among them, but these have been, as usual, referred to the stations where the men had been serving.

XV.—SUMMARY.

The following Tables show the principal results relative to the health of the Army at home and abroad in 1866, and the average of the six preceding years:—

SUMMARY, showing the Amount of Sickness, Mortality, and Invaliding, and the Average Number of Men constantly Non-effective from Sickness in the Army at Home and Abroad, during the year 1866.

WHITE TROOPS.	Mean Strength.	Admissions into Hospital.	Deaths.	Men sent to England as Invalids.	Discharged the Service as Invalids.	Average constantly Sick.	Annual Ratio per 1,000 of Strength.				
							Admitted into Hospital.	Died.	Sent Home as Invalids.	Discharged as Invalids.	Constantly Non-effective from Sickness.
United Kingdom	70,292	59,966	676	..	2,118	2,942	853	9·62	..	30·1	41·85
Gibraltar and Malta	9,787	7,490	87	185	182	407	765	8·89	18·9	18·6	41·59
British America	13,053	8,526	125	204	164	455	633	9·58	15·6	12·6	34·86
Bermudas	1,249	1,055	30	38	24	84	845	24·01	30·4	19·2	67·25
West Indies	1,070	2,491	45	84	14	110	1,492	26·94	20·4	8·4	65·87
Cape and St. Helena	4,495	4,496	47	111	88	283	1,000	10·46	24·7	19·6	51·84
Mauritius	1,781	1,350	25	54	31	77	758	14·01	30·3	17·4	43·23
Ceylon	886	1,177	19	43	20	52	1,328	21·44	48·5	22·6	58·69
Australasia	6,145	2,916	77	86	158	170	474	12·53	14·0	25·7	27·66
China and Japan	1,756	3,432	57	160	88	160	1,954	32·46	91·1	50·1	91·12
India	58,901	84,359	1,278	2,874	1,235	3,441	1,432	21·70	48·8	22·0	58·42
On board Ship*	6,735	4,140	71	..	..	..	615	10·54	..	..	..
Total	176,750	181,398	2,537	3,809	4,182	8,131	1,026	14·30	†35·86	23·66	47·82
COLONIAL CORPS.‡											
Malta	598	488	6	..	..	..	816	10·03	..	..	..
West Indies	1,855	2,305	49	..	22	114	1,243	26·41	..	7·4	61·46
Western Africa	1,129	1,798	43	..		69	1,593	38·09	..		61·12
Ceylon	1,207	1,366	17	..	17	49	1,132	14·09	..	14·1	40·60
China	285	605	12	..	..	20	2,123	42·11	..	..	70·18
On board Ship	436	566	7	..	..	..	1,298	16·05	..	..	..
Total	5,510	7,128	134	..	..	..	1,294	24·32	..	..	..

* The deaths of invalids on their passage home are not included under this head, but among the deaths of the stations from which they were invalided.
† This ratio is calculated on the strength of the troops serving abroad.
‡ The Cape Mounted Riflemen and Royal Canadian Rifle Regiment are included in the first division of this Table.

SUMMARY showing the Sickness, Mortality, and Invaliding, and the proportion constantly Non-effective from Sickness per 1,000 of Mean Strength in the Army at Home and Abroad during the six Years 1860-5.

Troops in	White Troops. Annual Ratio per 1,000 of Mean Strength. Admitted into Hospital.	Died.	Sent to England as Invalids.	Discharged the Service as Invalids.	Constantly Non-effective from Sickness.	Colonial Corps.* Annual Ratio per 1,000 of Mean Strength. Admitted into Hospital.	Died.	Sent to India as Invalids.	Discharged the Service as Invalids.	Constantly Non-effective from Sickness.
United Kingdom	993	9·30	..	39·14	51·26	..	..	..	..	..
Gibraltar and Malta	817	10·97	23·11	16·79	42·86	844	6·37	..	..	..
British America	643	9·10	15·89	12·61	28·92	..	..	..	..	..
Bermuda	725	37·77	17·98	11·18	36·86	..	..	..	..	..
West Indies	1,033	12·56	27·64	14·04	42·08	991	23·20	..	18·21	46·63
Western Africa	..	..	..	..	..	1,242	38·69	..		49·26
Cape and St. Helena	393	10·59	28·95	19·67	47·29	..	..	..	..	..
Mauritius	778	19·12	38·07	16·77	36·24	..	..	..	..	..
Ceylon	1,534	25·05	59·07	24·49	76·14	1,122	15·36	..	13·64	34·62
Australasia	620	17·56	21·91	17·06	35·44	..	..	..	..	..
China and Japan	2,008	59·98	56·52	19·68	75·42	1,586	26·63	19·35	..	49·03
India	1,685	28·38	35·60	16·97	65·67	..	..	..	..	..
On board Ship	788	16·71	..	..	..	..	..	..	..	..
Total	1,193	17·50	31·69	25·26	53·88	1,200	24·00	..	..	..

* The Cape Mounted Riflemen and the Royal Canadian Rifle Regiment are included in the first division of this Table.

Summary.

The general results in the Summary for 1866 show very favourably for the white troops, the admissions into hospital and deaths having been lower than in any year since the commencement of this series of Reports, and the discharges by invaliding lower than in any except 1860, 1863, and 1864. The average number of men constantly non-effective from sickness has been 6 per 1,000 under the average of the six preceding years, and has not amounted to 5 per cent. of the strength.

The admissions and deaths of the colonial troops do not give such favourable results, both being above the average of the preceding six years. The increase appears to have been due to the unhealthy state of these troops in the West Indies, Western Africa, and at Hong Kong.

APPENDIX.

APPENDIX No. I.

ABSTRACT, showing the Admissions into Hospital, Deaths, and Invaliding among the Troops in the United Kingdom in 1866.

	Household Cavalry.			Cavalry.			Royal Artillery.			Military Train.			Foot Guards.			Infantry.			Cavalry Depôt.			Roy. Art. Depôt Brigade.			Infantry Depôt Battalions.		
Strength	1,209			7,694			7,873			1,422			5,524			19,545			1,020			2,606			12,865.		
Diseases.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
I. *Zymotic Diseases.*																											
1. Miasmatic:																											
Variola	2	..	..	2	..	..	3	..	..	1	..	..	9	..	..	6	..	..	..	..	..	2	..	..	4	1	..
Varioloides	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	3	..	..
Varicella	..	..	..	..	..	..	..	..	..	1	..	..	2	..	..	1	..	..	..	..	..	1	..	..	4	..	..
Morbilli	1	..	..	..	..	..	10	..	..	..	..	..	4	..	..	14	..	..	..	..	..	12	..	..	9	..	..
Scarlatina	3	..	..	2	..	..	4	..	..	..	..	..	8	1	..	5	1	..	..	..	..	2	..	..	12	2	..
Diphtheria	..	..	..	..	..	..	..	..	..	..	..	..	2	1	..	..	..	..	..	..	..	..	..	..	1	..	..
Miliaria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Vaccinia	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	1	..	..
Tonsillitis	33	..	..	208	..	1	184	..	..	51	1	..	165	..	..	432	..	1	38	..	..	164	..	..	486	..	1
Influenza	11	..	..	103	..	..	40	..	..	21	..	..	62	..	..	238	..	..	..	..	..	26	..	..	170	1	..
Coryza	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..
Ophthalmia	6	..	..	57	..	3	96	..	6	6	..	1	44	..	..	386	..	24	30	..	1	44	..	1	225	..	21
Erysipelas	6	..	..	14	..	..	18	..	..	..	..	..	22	..	..	31	2	..	..	..	..	10	..	..	17	2	..
Furunculus	20	..	..	99	..	..	96	..	..	6	..	..	38	..	..	113	..	..	109	..	..	64	..	..	58	..	..
Anthrax	..	..	..	9	..	..	6	..	..	..	..	..	1	..	..	5	..	..	..	..	..	2	..	..	4	..	..
Dysenteria Acuta ..	..	..	..	2	..	..	2	..	..	..	..	..	2	..	..	11	..	..	1	..	..	4	..	..	9	..	..
" Chronica	..	..	..	1	1	..	23	..	..	1	..	..	..	..	..	7	..	2	2	..	1	9	..	..	41	3	4
Diarrhœa	35	..	..	169	..	..	148	1	..	37	..	..	143	..	..	317	1	..	21	..	..	56	1	..	141	1	3
Cholera Spasmodica	..	..	..	6	4	..	1	2	..	1	1	..	1	..	..	4	4	..	..	..	..	1	..	..	2	..	..
Febris Intermittens	2	..	..	12	..	..	73	..	..	2	..	..	4	..	..	193	..	..	6	..	..	31	..	..	123	..	8

Febris Remittens ..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	7	..	..	..	..	..	5	..	..	7	..	2
„ Typhoides ..	..	..	..	3	2	..	6	..	..	1	..	..	1	2	..	4	1	..	..	..	..	..	..	..	5	..	..
„ Typhus ..	..	..	..	2	1	..	..	..	..	..	..	..	..	..	..	5	1	..	..	..	..	2	..	..	2	5	..
„ Continua ..	5	..	..	83	4	..	87	2	..	20	..	..	103	2	..	274	8	..	11	..	..	63	1	..	162	2	..
Rheumatismus Acut.	25	..	..	168	1	..	226	..	..	36	..	..	90	..	1	458	..	..	15	..	..	84	1	..	192	1	..
„ Chron.	10	..	..	121	..	7	207	..	24	44	..	7	39	..	1	334	..	48	37	..	..	40	..	3	252	..	35
Parotitis	..	..	..	7	..	..	2	..	..	..	..	..	8	..	..	5	..	..	..	..	..	2	..	..	14	..	..
Pyæmia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	1	..	..	1	1	..
2. Enthetic:																											
Syphilis Primaria ..	69	..	..	444	..	..	568	..	..	154	..	..	872	..	..	1445	..	..	110	..	..	228	..	..	803	..	..
„ Secundaria	28	..	..	181	..	..	232	2	12	51	..	1	96	..	2	442	2	6	40	..	2	65	..	1	263	1	19
Iritis Syphilitica ..	1	..	..	11	..	11	8	..	..	4	..	..	8	..	2	16	..	1	5	..	..	1	..	..	26	..	5
Bubo „ ..	13	..	1	118	..	1	140	..	..	29	..	..	117	..	..	498	..	..	34	..	..	32	..	..	285	..	..
Gonorrhœa	53	..	..	438	..	..	735	..	..	132	..	..	352	..	..	2054	..	..	124	..	..	376	..	..	1618	..	..
Phymosis, &c. ..	1	..	..	18	..	..	10	..	..	..	..	..	10	..	..	38	..	..	1	..	..	7	..	..	35	..	..
Orchitis (Gonorrhœal)	11	..	..	30	..	..	36	..	1	5	..	..	37	..	..	88	..	..	16	..	..	16	..	..	68	..	..
Stricture Urethræ ..	..	..	..	13	..	..	21	..	1	1	..	..	14	..	1	37	..	3	16	..	..	10	..	..	46	2	4
Verrucæ	1	..	..	14	..	..	14	..	..	8	..	..	20	..	..	15	..	..	10	..	..	12	..	..	33	..	..
Cachexia Syphiloidea	..	..	..	..	..	..	..	..	..	..	..	..	2	..	3	..	..	..	..	..	..	..	..	..	..	..	..
Ulcus Penis ..	..	..	..	30	..	..	8	..	..	..	..	..	..	..	..	46	..	..	..	..	..	1	..	..	17	..	..
3. Dietic:																											
Scorbutus	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	3	..	..	..	..	..	1	..	..	2	..	..
Purpura	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	6	..	..	..	..	..	..	..	..	1	..	..
Ebriositas	12	..	..	24	2	..	101	4	..	18	..	..	37	..	..	106	1	..	9	..	..	21	..	..	85	2	..
Bronchocele ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	1
4. Parasitic:																											
Porrigo	..	..	..	10	..	..	9	..	1	..	..	..	..	..	..	37	..	1	..	..	..	4	..	..	18	..	..
Scabies	3	..	..	70	..	..	159	..	..	34	..	..	157	..	..	599	..	..	24	..	..	141	..	..	561	..	..
Tænia Solium ..	..	..	..	..	..	..	15	..	..	..	..	..	1	..	..	11	..	..	..	..	..	1	..	..	3	..	..
Vermes	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	2	..	..	..	..	..	3	..	..
Ascaris Lumbricoides	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..
„ Vermicularis ..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..

Appendix No. I—*continued.*

Diseases.	Household Cavalry.			Cavalry.			Royal Artillery.			Military Train.			Foot Guards.			Infantry.			Cavalry Depôt.			Roy. Art. Depôt Brigade.			Infantry Depôt Battalions.		
Strength	1,209			7,694			7,873			1,422			5,524			19,545			1,020			2,606			12,865		
	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
Aphthæ	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
Phthiriasis	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
II. *Constitutional Diseases.*																											
1. Diathetic:																											
Podagra	3	..	..	6	..	1	..	..	..	..	..	..	1	..	1	3	..	..	..	..	..	2	..	..	1	..	..
Lumbago	8	..	..	24	..	..	17	..	..	4	..	..	8	..	..	30	..	..	3	..	..	1	..	..	26	..	1
Ischias	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Anæmia	..	..	..	1	..	1	12	..	1	..	..	..	5	..	..	5	..	..	1	..	..	..	..	..	12	1	2
Anasarca	1	..	..	2	1	..	2	1	..	..	..	..	1	..	..	10	2	..	..	..	..	..	..	..	12	2	1
Tumores	2	..	..	6	..	..	10	1	1	2	..	..	4	..	..	3	..	1	..	..	..	6	..	1	5	..	3
Lupus	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Scirrhoma	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Carcinoma	..	..	..	1	1	1	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..
Gangræna	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
2. Tubercular:																											
Scrofula	..	..	..	18	1	11	24	..	9	4	..	3	11	..	4	61	1	15	1	..	1	3	..	2	43	1	15
Phthisis Pulmonalis	9	4	12	46	13	28	71	26	45	8	1	5	51	15	47	176	35	106	14	4	4	17	6	19	116	36	85
Hæmoptysis ..	3	..	..	12	1	2	30	3	1	2	..	..	23	1	6	52	..	4	2	..	..	4	..	1	27	2	1
Abscessus Psoanus..	..	..	..	1	..	..	1	1	..	..	..	..	..	..	..	2	..	1	..	..	..	1	2	..	..	..	..
Morbus Coxarius ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..

| III. *Local Diseases.* | | |

Appendix No. I—*continued*.

	Household Cavalry.			Cavalry.			Royal Artillery.			Military Train.			Foot Guards.			Infantry.			Cavalry Depôts.			Roy. Art. Depôt Brigade.			Infantry Depôt Battalions.		
Strength	1,209			7,694			7,873			1,422			5,524			19,545			1,020			2,606			12,865		
Diseases.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
2. Circulatory Syst:																											
Carditis	..	..	..	3	..	..	..	..	..	..	..	..	1	..	1	9	1	4	..	..	..	2	..	..	3	..	..
Pericarditis	..	..	..	4	1	2	4	..	1	..	..	..	1	..	..	4	1	2	1	..	..	..	..	..	4	1	..
Hypertrophia Cordis	..	..	..	19	3	9	12	2	3	2	..	1	..	..	2	36	3	11	4	..	..	1	1	1	26	2	17
Degeneratio Cordis	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	1	..
Morbus Valv: Cordis	1	1	..	15	2	9	18	5	18	2	1	1	13	2	10	54	5	33	4	1	2	21	2	20	69	4	28
Morbus Cordis ..	6	..	3	..	..	..	..	..	..	..	..	..	..	..	..	5	..	3	..	..	..	..	..	..	..	1	..
Aneurisma Aortæ ..	..	..	..	3	3	..	..	1	..	1	1	..	..	..	..	6	3	2	..	..	..	1	..	1	4	3	1
Aneurisma	..	..	1	3	2	1	4	5	..	1	1	1	5	1	4	6	1	3	..	..	..	..	..	..	2	1	..
Varix	1	..	2	10	..	23	20	..	17	..	..	..	9	..	3	21	..	22	3	..	3	2	..	..	13	..	21
Syncope	..	..	..	2	..	..	..	..	1	1	..	..	1	..	1	1	..	..	..	..	..	..	..	..	1	..	1
Palpitatio	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	14	..	2	1	..	..	1	..	..	..	..	..
Angina Pectoris ..	..	..	..	6	..	1	..	..	..	..	..	..	..	..	..	8	..	1	..	..	..	..	..	..	1	..	..
3. Respiratory Syst:																											
Laryngitis	..	..	..	3	..	1	2	..	..	..	..	..	1	..	1	3	..	..	4	..	..	..	..	..	7	..	..
Bronchitis Acuta ..	71	..	..	391	1	..	541	1	..	68	..	..	211	2	2	1222	4	..	63	..	..	108	1	..	580	4	6
,, Chronica	5	..	..	82	..	17	146	3	14	26	..	1	44	1	2	219	1	42	9	..	..	39	1	4	203	5	18
Pleuritis	1	..	..	19	..	1	33	1	..	4	..	..	16	1	3	39	2	..	4	..	..	8	..	..	58	1	3
Empyema	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Pneumonia	4	..	..	48	3	1	27	8	..	9	..	..	17	1	..	83	10	2	9	2	..	13	2	..	79	10	4
Apoplexia Pulmonalis	..	..	..	1	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Asthma	..	..	..	3	..	1	6	..	1	..	..	..	..	..	1	13	..	1	3	..	..	..	..	..	8	..	2
Emphysema ..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	..	1	1	..	..	..	..	2	..	..

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Appendix No. I—*continued.*

	Household Cavalry.			Cavalry.			Royal Artillery.			Military Train.			Foot Guards.			Infantry.			Cavalry Depôt.			Roy. Art. Depôt Brigade.			Infantry Depôt Battalions.		
Strength	1,209			7,694			7,873			1,422			5,524			19,545			1,020			2,606			12,865		
Disease	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
Lithiasis	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..	..
Cystitis	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	5	1	..	..	..	..	..	..	..	1	..	..
Fistula in Perineo ..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	3	..	1
Abscessus in Perineo	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Enuresis	..	..	..	5	..	1	8	..	1	4	..	..	1	..	..	25	..	1	3	..	..	1	..	..	27	..	2
Diuresis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..
Diabetes	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Calculus Vesicæ ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
6. Reproductive Syst:																											
Varicocele	3	..	1	1	..	1	6	..	..	..	..	..	4	..	..	3	..	1	..	..	..	..	..	..	2	..	..
Hydrocele	..	..	..	10	..	..	11	..	2	2	..	..	3	..	..	12	..	..	..	..	..	3	..	..	15	..	1
Orchitis (not Gonorr:)	10	..	..	57	..	..	102	..	2	16	..	..	36	..	..	182	..	2	22	..	1	25	..	3	98	..	4
Sarcocele	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..
7. Locomotive Syst:																											
Arthritis	..	..	..	4	..	1	3	..	1	..	..	..	3	..	1	5	..	..	..	..	..	1	..	..	9	..	2
Synovitis	..	..	..	10	..	2	31	..	3	..	..	..	8	..	..	23	..	3	1	..	..	4	..	1	10	..	1
Hydrarthrus ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	2	..	..	..	..	..	1	..	1
Contractura ..	..	..	..	6	..	3	..	..	..	..	..	..	2	..	..	11	..	10	2	..	4	..	..	..	4	..	3

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Appendix No. I—*continued.*

	Household Cavalry			Cavalry.			Royal Artillery.			Military Train.			Foot Guards.			Infantry.			Cavalry Depôts.			Roy. Art. Depôt Brigade.			Infantry Depôt Battalions.		
Strength	1,239			7,694			7,873			1,422			5,524			19,545			1,020			2,606			12,865		
Diseases.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
IV. *Developmental Diseases.*																											
4. Diseases of Nutrition:																											
Atrophia	..	..	..	7	..	1	20	..	7	3	..	1	7	..	1	45	..	12	3	..	1	6	..	1	50	..	15
Violent Deaths or Diseases.																											
1. Accidental:																											
Ambustio	..	..	..	8	..	..	14	..	..	2	..	..	9	..	..	63	..	..	1	..	..	10	..	..	30	..	..
Explosio	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
Insolatio	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	4	..	1
Submersio	..	..	..	..	1	..	..	1	..	..	2	..	..	1	..	..	6	..	..	..	..	..	2	..	..	2	..
Asphyxia	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Fractura	5	..	..	35	..	1	44	2	9	5	..	..	13	1	1	60	2	7	..	1	..	4	..	..	24	..	3
Amputatio	..	..	..	..	..	..	3	..	6	1	..	..	..	..	..	1	..	1	..	..	..	2	..	..	2	..	2
Resectio	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ruptura Vesicæ ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Contusio	61	..	..	398	2	..	426	..	3	77	..	..	91	..	..	535	1	1	60	..	1	122	..	1	343	1	..
Commotio	..	..	..	1	..	..	..	2	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	1	1	..
Vulnus Sclopetarium	..	..	..	1	..	1	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	1	..	2
„ Incisum ..	29	..	..	123	..	..	132	..	1	24	..	..	124	..	1	198	..	1	18	..	..	29	..	..	115	..	..

Luxatura	1	..	..	13	..	2	3	..	1	..	..	..	3	..	..	18	..	2	..	..	..	2	..	..	2	..	..	..	..
Subluxatio	18	..	..	130	..	..	183	..	..	22	..	..	90	..	..	301	..	1	17	..	..	41	..	..	178	..	3	..	..
Vesicatæ Pedis ..	..	..	..	13	..	..	18	..	..	2	..	..	11	..	..	56	..	..	30	..	..	6	..	..	40	..	..	..	..
Venenatio	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
Morsus Canis ..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..
„ Equi ..	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	..	..	1	..	..	..	..	..	..	..
„ Hominis ..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
„ Ursæ ..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4. Suicidal:																													
Vulnus Sclopetarium	..	1	..	1	3	..	1	2	..	..	..	..	..	1	..	3	3	1	..	1	..	..	..	..	..	4	..	..
„ Incisum ..	1	..	..	2	..	..	..	..	..	..	..	..	..	..	..	2	1	..	..	2	..	2	1	..	..	..	..	1	..
Suspendium ..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Venenatio	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Per Vias Ferreas ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
5. Executio: ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
6. Punitus: ..	..	..	..	10	..	..	19	..	..	3	..	..	4	..	..	50	..	..	1	..	..	1	..	..	30	..	..	..	..
No appreciable disease	..	..	..	..	..	..	1	..	..	..	..	..	2	..	..	7	..	..	..	..	..	..	..	..	11	..	..	..	..
Total ..	746	8	26	5366	61	215	6730	87	250	1194	10	32	4018	38	128	14,781	140	516	1207	15	37	2504	25	92	10,239	133	498		

APPENDIX No. II.

ABSTRACT, showing the Number of Men belonging to the Regiments serving at Home who were Vaccinated during the Year 1866.

	Results.	In those who bore Marks of previous Small-pox.	In those who bore good Marks of previous Vaccination.	In those who bore doubtful Marks of previous Vaccination.	In those who bore no Marks of previous Vaccination or Small-pox.	Total.
Soldiers, not Recruits.	A perfect vaccine pustule	6	20	31	20	77
	A modified ditto	12	48	53	31	144
	A failure in	11	72	65	14	162
	Total	29	140	149	65	383
Recruits.	A perfect vaccine pustule	178	3,567	118	302	4,165
	A modified ditto	252	3,290	113	149	3,804
	A failure in	343	3,631	97	170	4,241
	Total	773	10,488	328	621	12,210

APPENDIX No. III.

ABSTRACT, showing the Ages of the Men serving in the different Arms at Home, and the Deaths at each Age in 1866.

	Under 20.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.
Household Cavalry	75	..	411	1	282	2	196	2	126	1	119	2	1,209	8
Cavalry of the Line	876	4	2,340	12	2,839	17	930	17	446	5	225	6	7,694	61
Royal Artillery	493	2	1,757	17	3,041	21	1,941	36	561	10	80	2	7,873	88
Military Train	201	..	402	2	588	6	187	2	35	..	9	..	1,422	10
Foot Guards	1,007	2	1,729	10	1,525	12	850	8	354	5	59	1	5,524	38
Infantry Regiments	3,591	8	5,607	26	5,461	43	2,967	23	1,677	33	242	7	19,545	140
Total	6,243	16	12,246	68	13,736	101	7,071	88	3,199	54	734	18	43,267	345
Cavalry Depôt	167	1	360	2	250	3	152	3	60	2	31	3	1,020	14
Depôt Brigade, R.A.	759	2	842	8	548	7	341	3	85	5	31	..	2,606	25
Depôt Battalions	3,763	18	3,223	21	2,592	39	1,479	23	1,484	28	315	4	12,856	133
Total	4,689	21	4,425	31	3,390	49	1,972	29	1,629	35	377	7	16,482	172
Coast Brigade, R.A.	7	..	62	..	256	1	580	7	727	16	148	6	1,780	30

APPENDIX No. IV.

ABSTRACT, showing the Number of Recruits Inspected, and the Number found unfit for Service in each of the Recruiting Districts during the Year 1866.

Districts.		Primary Inspections.	Secondary Inspections.		Total.
			Had been previously examined by Staff Surgeon or other Army Medical Officer.	Had been previously examined by Private Medical Practitioner.	
London ..	Inspected	4,020	493	1,942	6,455
	Rejected	1,408	40	251	1,699
Liverpool..	Inspected	1,438	208	305	1,951
	Rejected	642	14	55	711
Bristol ..	Inspected	259	53	399	711
	Rejected	68	8	107	183
Leeds ..	Inspected	321	40	206	567
	Rejected	149	5	72	226
Edinburgh*	Inspected	149	13	35	197
	Rejected	60	..	5	65
Glasgow ..	Inspected	730	107	76	913
	Rejected	336	4	24	364
Dublin ..	Inspected	1,496	146	146	1,788
	Rejected	575	7	20	602
Cork* ..	Inspected	64	..	..	64
	Rejected	27	..	..	27
Belfast ..	Inspected	441	31	168	640
	Rejected	224	7	34	265
Total	Inspected ..	8,918	1,091	3,277	13,286
	Rejected ..	3,489	85	568	4,142

APPENDIX No. V.

ABSTRACT, showing the Native Country of the Recruits inspected at the Head Quarters of each of the Districts in 1866.

Districts.	England.		Wales.		Scotland.		Ireland.		British Colonies or Foreign Countries.	
	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.
London ..	3,661	1,294	16	5	85	29	243	74	15	6
Liverpool ..	820	377	44	19	69	23	492	219	13	4
Bristol ..	236	61	1	..	..	..	22	7	..	..
Leeds ..	254	124	2	..	18	7	47	18	..	..
Edinburgh*..	9	4	..	..	128	51	11	4	1	1
Glasgow ..	28	16	..	..	496	232	206	88	..	..
Dublin ..	56	11	..	..	16	4	1,423	560	1	..
Cork* ..	2	1	..	..	1	..	61	26	..	..
Belfast ..	10	4	..	..	13	7	412	212	6	1
Total ..	5,076	1,892	63	24	826	353	2,917	1,208	36	12

* See foot note on page 33.

APPENDIX No. VI.

ABSTRACT showing the Ages of the Recruits inspected in 1866.

	Boys under 17.	From 17 to 18.	From 18 to 19.	From 19 to 20.	From 20 to 21.	From 21 to 22.	From 22 to 23.	From 23 to 24.	From 24 to 25.	25 and Upwards.
At Head Quarters of Recruiting Districts*	102	482	2,527	1,784	1,042	791	717	634	548	291
At Regiments and Depôts* ...	221	564	1,780	1,015	729	508	376	300	210	129
By Civil Medical Practitioners ...	35	411	2,289	1,277	940	668	561	444	441	70
Total	358	1,457	6,596	4,076	2,711	1,967	1,654	1,378	1,199	490

* In one-third of the Regimental Returns, both primary and secondary inspections are included.

APPENDIX No. VII.

ABSTRACT showing the Heights of the Recruits Inspected in 1866.

	Under 5 ft. 3 in	From 5 ft. 3 in. to 5 ft. 4 in.	From 5 ft. 4 in. to 5 ft. 5 in.	From 5 ft. 5 in. to 5 ft. 6 in.	From 5 ft. 6 in. to 5 ft. 7 in.	From 5 ft. 7 in. to 5 ft. 8 in.	From 5 ft. 8 in. to 5 ft. 9 in.	From 5 ft. 9 in. to 5 ft. 10 in.	From 5 ft. 10 in. to 5 ft. 11 in.	From 5 ft. 11 in. to 6 ft.	6 ft. and Upwards.
At Head Quarters of Recruiting Districts ...	89	146	1,455	2,756	1,933	1,262	705	336	152	64	20
At Regiments & Depôts. *	191	148	908	1,397	951	784	588	383	150	157	144
By Civil Medical Practitioners	26	9	460	2,118	1,639	1,249	831	443	206	92	63
Total	306	303	2,823	6,271	4,523	3,295	2,124	1,162	508	313	227

* Information as to 31 men recruited for various Regiments not given, and in several cases the results of both primary and secondary inspections are included.

APPENDIX No. VIII.

ABSTRACT, showing the Number of Recruits inspected in 1866, at the Head-Quarters of Recruiting Districts, at the following Weights and Ages.

Ages and Country.	Under 100 lbs.	From 100 lbs. to 110 lbs.	From 110 lbs. to 120 lbs.	From 120 lbs. to 130 lbs.	From 130 lbs. to 140 lbs.	From 140 lbs. to 150 lbs.	From 150 lbs. to 160 lbs.	From 160 lbs. to 170 lbs.	From 170 lbs. and upwards.	Total.
Boys under 17—										
England	7	...	2	...	...	...	...	...	...	9
Scotland	2	1	...	...	...	...	...	...	...	3
Ireland	70	18	2	...	...	...	...	...	...	90
From 17 to 18—										
England	...	26	75	71	23	3	1	...	1	200
Scotland	...	4	30	18	1	...	...	...	...	53
Ireland	8	44	117	41	17	2	...	...	...	229
From 18 to 19—										
England	...	33	451	783	264	102	12	1	...	1,646
Scotland	...	12	70	112	51	16	...	1	...	262
Ireland	1	34	220	212	103	41	8	...	...	619
From 19 to 20—										
England	...	14	303	562	384	73	18	...	...	1,354
Scotland	...	...	20	40	52	14	8	...	...	134
Ireland	...	7	52	93	89	48	7	...	...	296
From 20 to 21—										
England	...	5	119	271	162	119	13	4	3	696
Scotland	...	...	12	37	42	28	...	14	...	133
Ireland	...	1	32	52	59	55	11	3	...	213
From 21 to 22—										
England	...	7	88	182	168	99	15	4	3	566
Scotland	...	2	8	22	20	12	13	2	...	79
Ireland	...	2	15	34	44	27	16	5	3	146
From 22 to 23—										
England	...	5	93	158	127	98	20	7	1	509
Scotland	...	1	9	17	17	25	10	1	...	80
Ireland	...	1	12	24	43	26	15	3	4	128
From 23 to 24—										
England	...	4	82	130	134	80	18	7	1	456
Scotland	...	...	5	12	16	15	9	2	...	59
Ireland	...	1	6	19	37	37	12	3	4	119
From 24 to 25—										
England	...	4	34	84	138	60	31	11	3	365
Scotland	...	...	11	18	13	12	6	1	...	61
Ireland	...	...	14	21	42	29	12	2	2	122
Upwards of 25—										
England	...	...	16	49	88	47	26	8	3	237
Scotland	...	...	...	4	3	4	1	2	1	15
Ireland	...	...	5	9	13	8	2	1	1	39
Total	88	226	1,903	3,075	2,150	1,080	284	82	30	8,918

APPENDIX No. IX.

ABSTRACT, showing the State of Education of the Recruits examined at the Head Quarters of the Recruiting Districts and at Regiments and Depôts in 1866.

Districts.	Well Educated.	Able to Write.	Able to Read only.	Unable to Read.	Total.
Recruiting Districts ..	345	5,745	747	2,081	8,918
Regiments and Depôts	297	2,947	401	642	*4,287
Total	642	8,692	1,148	2,723	13,205

* The difference between this total and that shown in previous Tables is due to the omission of information as to the education of 12 recruits inspected for the 2nd Battalion of the 2nd Regiment, of 7 for the 63rd Regiment, and of 50 rejected for the 1st Battalion of the 3rd Regiment, and for the 85th Regiment.

APPENDIX No. X.

ABSTRACTS, showing the Admissions into Hospital and Deaths among the Troops serving in the Mediterranean in the year 1866.

Stations	Gibraltar.		Malta.		Native Troops. R. Malta Fencibles.	
Strength	4,585		5,202		598	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*						
1. Miasmatic Diseases:						
Variola	10	..	..	..	..	..
Varicella	..	..	2	..	..	..
Scarlatina	1	..	2	..	..	..
Tonsillitis	66	..	98	..	18	..
Influenza	44	..	6	..	..	..
Ophthalmia	157	..	266	..	139	..
Erysipelas	3	..	8	..	..	..
Furunculus	20	..	48	..	..	..
Anthrax	1	..	7	..	..	..
Pyæmia	..	..	..	2	..	..
Dysenteria Acuta	18	..	34	..	..	..
„ Chronica	..	..	9	..	..	..
Diarrhœa	74	..	276	..	11	..
Febris Intermittens	15	..	4	..	..	..
„ Remittens	..	..	69	1	..	..
„ Typhoides	8	1	23	6	..	..
„ Typhus	1	..	..	..	..	..
„ Continua	139	2	1008	13	4	..
Rheumatismus Acutus	31	..	95	..	40	..
„ Chronicus	94	..	292	..	7	..
Parotitis	1	..	1	..	..	..
Coryza	..	..	1	..	..	..
2. Enthetic Diseases:						
Syphilis Primaria	210	..	82	..	8	..
„ Secundaria	68	..	73	..	3	..
Iritis Syphilitica	2	..	5	..	..	..
Bubo	77	..	19	..	..	..
Gonorrhœa	315	..	101	..	22	..
Phymosis, &c.	..	..	3	..	..	..
Orchitis (Gonorrhœal)	21	..	5	..	1	..
Strictura Urethræ	16	..	19	..	..	..
Verrucæ	6	..	1	..	..	..
Ulcus Penis	..	..	2	..	..	..
3. Dietic Diseases:						
Purpura	2	..	2	..	..	..
Ebriositas	35	..	85	..	1	..
Rachitis	..	..	1	..	..	..
4. Parasitic Diseases:						
Porrigo	6	..	2	..	..	..
Scabies	7	..	3	..	1	..

Appendix No. X—*continued.*

Stations	Gibraltar.		Malta.		Native Troops. R. Malta Fencibles.	
Strength	4,585		5,202		598	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Tænia Solium	6	..	34	..	..	..
Aphthæ	..	..	1	..	..	..
II. *Constitutional Diseases.*						
1. Diathetic Diseases:						
Podagra	2	..	..	..	..	..
Lumbago	10	..	10	..	..	..
Anæmia	2	..	8	..	..	..
Anasarca	1	..	3	..	..	..
Tumores	5	..	4	..	..	..
Carcinoma	..	..	1	..	..	..
Gangræna	..	..	1	..	..	..
2. Tubercular Diseases:						
Scrofula	2	..	8	..	..	..
Phthisis Pulmonalis	29	4	43	9	5	3
Hæmoptysis	17	..	10	1	..	..
III. *Local Diseases.*						
1. Of the Nervous System:						
Encephalitis	..	..	1	1	..	..
Meningitis	..	..	1	..	..	..
Myelitis	..	..	1	..	..	..
Apoplexia	2	2	..	..	..	1
Paralysis	4	..	5	..	..	..
Delirium Tremens	4	..	9	..	..	..
Mania	6	..	..	..	..	..
Amentia	1	..	4	..	2	..
Epilepsia	10	..	12	..	..	..
Convulsio	..	..	..	..	4	..
Cephalæa	8	..	18	..	..	..
Vertigo	..	..	2	..	..	..
Neuralgia	..	..	17	..	..	..
Dysecœa	..	..	7	..	..	..
Otitis	9	..	23	..	1	..
Iritis	1	..	7	..	..	..
Polypus Nasi	2	..	..	..	..	..
Hemeralopia	..	..	1	..	..	..
Myopia	..	..	1	..	..	..
Amaurosis	..	..	2	..	..	..
Cæcitas	..	..	1	..	..	..
2. Of the Circulatory System:						
Carditis	1	..	..	..	..	..
Pericarditis	4	..	7	1	..	..
Hypertrophia Cordis	2	1	7	1	..	..
Degeneratio Cordis	..	..	2	..	..	..
Morbus Valv: Cordis	6	2	24	3	2	..
Morbus Cordis	..	..	2	..	..	..

Appendix No. X—*continued.*

Stations	Gibraltar.		Malta.		Native Troops. R. Malta Fencibles.	
Strength	4,585		5,202		598	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Palpitatio Cordis	..	..	16	..	..	..
Syncope	..	..	1	..	..	..
Aneurisma Aortæ	2	1	4	4	..	..
Ruptura Aortæ	..	..	..	1	..	..
Varix	5	..	12	..	..	..
Atheroma Arteriarum	..	..	..	1	..	..
Angina Pectoris	..	..	..	..	..	1
3. Of the Respiratory System:						
Laryngitis	1	..	..	..	..	..
Bronchitis Acuta	101	..	136	1	34	1
„ Chronica	57	..	72	..	6	..
Pleuritis	11	..	17	..	..	..
Pleurodynia	..	..	6	..	..	..
Empyema	..	..	1	..	..	..
Pneumonia	8	..	28	2	..	..
Apoplexia Pulmonalis	..	..	1	..	..	..
Asthma	7	1	3	..	..	..
Epistaxis	..	..	..	..	..	..
4. Of the Digestive System:						
Stomatitis	..	..	1	..	..	..
Pharyngitis	..	..	1	..	..	..
Gastritis	2	..	3	..	3	..
Enteritis	..	..	1	..	3	..
Peritonitis	..	..	3	1	..	..
Obstipatio	..	..	27	..	..	..
Dyspepsia	65	..	123	..	78	..
Colica	4	..	10	..	..	..
Hæmatemesis	..	..	..	1	..	..
Hernia	4	..	15	..	..	..
Hæmorrhois	11	..	15	..	2	..
Fistula in ano	5	..	2	..	..	..
Splenitis	..	..	3	..	..	..
Hepatitis Acuta	4	..	9	..	..	..
„ Chronica	5	..	28	..	..	..
Icterus	8	..	28	..	..	..
Ascites	2	..	1	1	1	..
5. Of the Urinary System:						
Nephritis	..	..	5	1	..	..
Nephria	2	..	2	..	..	..
Ischuria	..	..	2	..	..	..
Hæmaturia	..	..	1	..	..	..
Lithiasis	1	..	..	..	..	..
Cystitis	..	..	2	..	..	..
Fistula in Perineo	2	..	..	..	..	..
Enuresis	2	..	4	..	..	..
Diuresis	1	..	..	..	..	..

Appendix No. X—*continued.*

Stations	Gibraltar.		Malta.		Native Troops. R. Malta Fencibles.	
Strength	4,585		5,202		598	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
6. Of the Reproductive System:						
Orchitis (not Gonorrhœal)	55	..	94	..	3	..
Sarcocele	4	..	..	..	..	..
Hæmatocele	..	..	1	..	..	..
Varicocele	1	..	3	..	..	..
Hydrocele	10	..	7	..	..	..
Strictura Urethræ	..	..	2	..	..	..
Spermatorrhœa	..	..	1	..	..	..
7. Of the Locomotive System:						
Arthritis	4	..	6	..	..	..
Synovitis	4	..	10	..	..	..
Contractura	..	..	1	..	..	..
Periostitis	4	..	7	..	..	..
Exostosis	..	..	1	..	..	..
Caries	2	..	..	..	..	..
Necrosis	2	..	..	..	..	..
8. Of the Integumentary System:						
Urticaria	1	..	4	..	..	..
Eczema	29	..	33	..	..	..
Herpes	3	..	11	..	1	..
Impetigo	..	..	1	..	..	..
Psoriasis	8	..	18	..	..	..
Lepra	2	..	4	..	..	..
Pityriasis	5	..	2	..	..	..
Acne	..	..	2	..	..	..
Mentagra	..	..	2	..	..	..
Chloasma	..	..	1	..	..	..
Phlegmon	91	..	190	..	..	..
Abscessus	107	..	87	..	31	..
Paronychia	19	..	20	..	..	..
Ulcus	124	..	235	..	15	..
IV. *Developmental Diseases.*						
4. Diseases of Nutrition:						
Atrophia	3	..	79	..	..	..
V. *Violent Deaths or Diseases.*						
1. Accidental:						
Ambustio	8	..	7	..	..	..
Insolatio	..	..	4	..	..	..
Submersio	..	..	1	3	..	..
Fractura	20	1	16	4	..	..
Ruptura Duodeni	..	..	..	1	..	..
Contusio	144	..	189	..	16	..
Commotio	..	..	1	..	..	..
Vulnus Incisum	68	..	75	..	26	..
Luxatura	6	..	1	..	..	..
Subluxatio	63	..	113	..	..	..

Appendix No. X.—*continued.*

Stations	Gibraltar.		Malta.		Native Troops. R. Malta Fencibles.	
Strength	4,585		5,202		598	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Vesiculæ Pedis	5	..	37	..	..	..
Morsus Hominis..	2	..	1	..	..	..
„ Canis	1	..	..	..	..	..
„ Simiæ	..	..	2	..	..	..
4. Suicidal:						
Vulnus Sclopetarium	..	..	..	2	..	..
„ Incisum	1	..	..	..	..	..
Venenatio	..	..	1	..	..	..
6. Punitus	4	..	8	..	..	..
No Appreciable Disease..	..	..	7	..	..	..
Total	2,692	15	4,798	61	488	6

CAUSES of the Deaths among the Invalids.

	From Gibraltar.	From Malta.
Phthisis Pulmonalis	2	4
Encephalitis	1	..
Morbus Valv: Cordis..	..	1
Aneurisma Aortæ	1	..
Nephritis	1	..
Asthenia	..	1
Total	5	6

APPENDIX No. XI.

ABSTRACT, showing the Diseases of the Men sent home as Invalids from the Mediterranean during the Year 1866, and of those finally discharged the Service.

Stations	Gibraltar.		Malta.	
Average Strength	4,585		5,202	
Diseases.	Sent Home.	Discharged at Netley.	Sent Home.	Discharged at Netley.
I. Zymotic Diseases.				
1. Miasmatic:				
Ophthalmia	22	21	4	6
Diarrhœa	..	..	3	..
Febris Typhoides	1	..	1	..
„ Continua	2	1	4	1
Rheumatismus Acutus	1	..	..	..
„ Chronicus	3	5	8	6
2. Enthetic:				
Syphilis Secundaria	7	5	3	6
Strictura Urethræ	1	1	1	2
3. Dietic:				
Purpura	1	1	..	..
II. Constitutional Diseases.				
1. Diathetic:				
Anæmia	..	..	1	..
2. Tubercular:				
Scrofula	..	2	..	..
Phthisis Pulmonalis	8	11	13	12
Hæmoptysis	..	..	1	..
Tuberculosis	..	..	1	..
III. Local Diseases.				
1. Nervous:				
Paralysis	..	2	1	4
Mania	2	..	..	..
Amentia	..	..	2	..
Epilepsia	2	3	4	4
Cephalæa	1	2	2	1
Dysecœa	..	..	..	2
Otitis	..	..	1	1
Myopia	1	..	..	..
Cæcitas	..	2	1	8
Amaurosis	..	..	1	..
2. Circulatory:				
Pericarditis	..	..	..	1
Hypertrophia Cordis	1	1	2	4
Morbus Valv: Cordis	2	5	7	11
Morbus Cordis	..	..	1	..
Aneurisma Aortæ	2	2	1	..
Varix	1	3	3	2

Appendix No. XI—*continued.*

Stations	Gibraltar.		Malta.	
Average Strength	4,585		5,202	
Diseases.	Sent Home.	Discharged at Netley.	Sent Home.	Discharged at Netley.
3. Respiratory:				
Bronchitis Acuta	13	..	1	..
„ Chronica	..	6	3	2
Pleuritis	..	..	..	1
Asthma	3	2	..	..
4. Digestive:				
Gastritis	1	..	..	..
Peritonitis	..	..	1	1
Dyspepsia	..	..	..	1
Hernia	2	1	2	1
Fistula in Ano	1	..	..	2
Prolapsus Ani	..	..	..	1
Hepatitis Chronica	2	2	1	1
Melæna	..	..	1	..
5. Urinary:				
Enuresis	1	1	..	..
6. Reproductive:				
Variocele	..	1	..	..
Hydrocele	2	..	..	..
Hydrosarcocele	2	1	..	..
7. Locomotive:				
Arthritis	2	1	..	..
Contractura	1	1	..	..
Periostitis	1	1	1	..
Caries	2	1	1	2
Necrosis	1	1	..	..
Malformatio Pedis	..	..	..	1
8. Integumentary:				
Eczema	2	..	..	..
Impetigo	..	..	..	1
Psoriasis	..	..	1	..
Abscessus	..	1	..	..
Ulcus	2	2	2	1
IV. *Developmental Diseases.*				
4. Diseases of Nutrition:				
Atrophia	..	2	4	3
V. *Violent Deaths or Diseases.*				
1. Accidental:				
Fractura	3	1	..	..
Luxatura	..	..	1	1
Subluxatio	..	..	1	..
Total	99	92	86	90

APPENDIX No. XII.

ABSTRACT, showing the Ages of the Troops serving in the Mediterranean Commands, and the Deaths at each Age, during the Year 1866.

Station.	Corps.	Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total	
		Strength on 1st January.	Died.	Strength on 1st January.	Died.	Strength on 1st January.	Died.	Strength on 1st January.	Died.	Strength on 1st January.	Died.	Strength on 1st January.	Died.	Strength on 1st January.	Died.
Gibraltar ..	11th Brigade Royal Artillery ..	13	..	302	..	306	2	90	2	38	..	10	..	759	4
	Royal Engineers	2	..	41	..	161	1	60	1	21	..	3	..	288	2
	2nd Battalion 15th Foot ..	12	..	151	..	357	..	106	..	32	..	8	..	666	..
	32nd Foot	114	..	257	..	229	1	110	1	36	..	..	..	746	2
	78th „	95	..	375	1	153	2	55	..	24	1	2	..	704	4
	86th „	59	..	286	1	193	2	125	..	46	..	8	..	717	3
Malta	*Royal Artillery*	18	..	205	2	265	7	189	4	63	2	9	..	749	15
	Royal Engineers	*6*	..	*15*	..	*88*	2	*43*	..	16	..	5	..	173	2
	2nd Battalion 8th Foot ..	16	1	123	..	485	3	88	..	33	..	4	..	749	4
	29th Foot	99	2	263	5	163	1	94	2	67	2	3	..	689	12
	84th „	140	..	188	2	218	9	75	3	71	..	..	..	692	14
	Total	574	3	2,206	11	2,618	30	1,035	13	447	5	52	..	6,932	62

P 2

APPENDIX No. XIII.

ABSTRACT, showing the Admissions into Hospital and Deaths among the Troops serving in British America in the Year 1866.

Stations	Canada.		Nova Scotia.		Newfoundland.		Bermuda	
Average Annual Strength	9,519.		3,247		287		1,249	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*								
1. Miasmatic Diseases:								
Variola	6	..	..	..	..	..	..	..
Varicella	2	..	..	..	..	..	..	..
Morbilli	6	..	1	..	..	..	..	..
Scarlatina	..	..	1	..	..	..	..	..
Tonsillitis	224	..	70	..	7	..	10	..
Influenza	28	..	32	..	2	..	4	..
Ophthalmia	180	..	115	..	2	..	11	..
Erysipelas	32	..	7	..	..	..	1	..
Furunculus	37	..	18	..	..	..	5	..
Anthrax	11	..	2	..	1	..	3	..
Dysenteria Acuta	21	1	..	..	..	..	17	1
„ Chronica	2	..	..	..	..	..	3	..
Diarrhœa	330	..	48	..	1	..	106	1
Cholera	6	1	..	..	..	..	..	..
„ Spasmodica	..	..	..	..	..	..	5	..
Febris Intermittens	47	..	4	..	..	..	2	..
„ Remittens	5	..	3	..	..	..	1	..
„ Typhoides	6	3	18	4	..	..	20	8
„ Typhus	1	..	1	..	..	..	..	..
„ Continua	148	4	23	1	..	..	110	4
Rheumatismus Acutus	215	1	30	..	1	..	17	..
„ Chronicus	96	..	45	..	4	..	12	..
Parotitis	3	..	1	..	..	..	..	..
2. Enthetic Diseases:								
Syphilis Primaria	525	..	84	..	..	..	49	..
„ Secundaria	156	..	38	..	7	..	24	..
Iritis Syphilitica	5	..	1	..	..	..	1	..
Bubo	100	..	31	..	..	..	11	..
Gonorrhœa	451	..	119	..	8	..	30	..
Phymosis, &c.	6	..	2	..	..	..	..	..
Orchitis (Gonorrhœal)	28	..	8	..	..	..	4	..
Strictura Urethræ	25	1	3	..	..	..	2	..
Verrucæ	16	..	3	..	..	..	1	..
Ulcus Penis	7	..	4	..	..	..	..	..
3. Dietic Diseases:								
Scorbutus	162	..	1	..	..	..	..	..
Purpura	4	..	..	..	..	..	..	..
Ebriositas	..	2	57	..	5	..	49	..
Bronchocele	1	..	..	..	..	..	1	..
4. Parasitic Diseases:								
Aphthæ	1	..	..	..	..	..	..	..
Porrigo	6	..	1	..	..	..	1	..

Appendix No. XIII—*continued.*

Stations	Canada.		Nova Scotia.		Newfoundland.		Bermuda.	
Average Annual Strength	9,159		3,247		287		1,249	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Scabies	98	..	10	..	..	..	3	..
Tænia Solium	14	..	1	..	..	..	..	..
II. *Constitutional Diseases.*								
1. Diathetic Diseases:								
Podagra	2	..	1	..	..	..	..	..
Lumbago	21	..	3	..	..	..	5	..
Anæmia	5	..	..	..	..	..	4	..
Anasarca	4	..	..	..	..	..	..	..
Tumores	6	..	1	..	..	..	3	..
Carcinoma	1	1	1	..	..	..	..	..
2. Tubercular Diseases:								
Scrofula	9	..	7	..	..	..	2	..
Phthisis Pulmonalis	41	8	23	2	4	1	27	8
Hæmoptysis	18	2	5	..	1	..	7	..
Morbus Coxarius	1	..	..	..	..	..	..	..
III. *Local Diseases.*								
1. Nervous:								
Encephalitis	2	1	..	..	..	..	4	1
Meningitis	2	..	1	..	..	..	..	..
Apoplexia	1	3	1	2	..	..	..	1
Paralysis	14	1	4	..	..	..	3	..
Delirium Tremens	41	1	8	3	5	..	22	5
Mania	4	..	..	..	..	..	..	..
Amentia	10	..	5	..	..	..	2	..
Epilepsia	11	..	4	..	1	..	5	..
Convulsio	1	..	1	..	..	..	..	..
Cephalæa	21	..	8	..	2	..	7	..
Vertigo	2	..	..	..	..	..	..	..
Neuralgia	20	..	2	..	..	..	..	..
Dysecœa	4	..	2	..	..	..	2	..
Otitis	17	..	10	..	..	..	7	..
Iritis	..	..	5	..	..	..	1	..
Amaurosis	..	..	..	..	..	..	1	..
Fistula Lachrymalis	1	..	..	..	..	..	..	..
Cæcitas	6	..	..	..	..	..	..	..
Cataractes	1	..	1	..	..	..	..	..
Sclerotitis	1	..	..	..	..	..	..	..
Glaucoma	..	..	1	..	..	..	..	..
Polypus Nasi	..	..	1	..	..	..	..	..
2. Circulatory:								
Carditis	1	..	1	..	..	..	..	..
Pericarditis	4	..	..	..	..	..	1	..
Hypertrophia Cordis	5	..	2	..	..	..	..	..
Atrophia Cordis	1	1	..	..	..	..	..	..
Morbus Valv: Cordis	33	3	2	1	..	1	7	1

Appendix No. XIII—*continued.*

Stations	Canada.		Nova Scotia.		Newfoundland.		Bermuda.	
Average Annual Strength	9,519		3,247		287		1,249	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Angina Pectoris	..	..	2	..	..	..	1	..
Aneurisma Aortæ	9	7	..	1	..	..	1	..
Aneurisma	1	..	..	..	..	..	..	..
Varix	6	..	1	..	..	..	..	..
Syncope	..	..	..	..	..	..	1	..
3. Respiratory:								
Laryngitis	1	..	1	..	..	..	..	..
Bronchitis Acuta	44	5	71	2	16	..	28	..
„ Chronica	14	..	28	..	4	..	7	..
Pleuritis	40	..	9	..	1	..	1	..
Pneumonia	146	19	14	2	2	..	1	..
Asthma	2	..	2	..	..	..	..	..
Epistaxis	3	1	..	..	..	..	1	..
Pleurodynia	..	..	3	..	..	..	1	..
Œdema Glottidis	1	..	..	..	..	..	..	..
Empyema	..	..	1	..	..	..	..	..
Apoplexia Pulmonalis	..	1	..	..	..	..	..	..
4. Digestive:								
Stomatitis	7	..	1	..	..	..	1	..
Gastritis	1	..	..	..	..	..	..	..
Enteritis	1	..	..	..	..	..	..	..
Peritonitis	1	..	..	..	..	..	1	1
Obstipatio	9	..	8	..	..	..	2	..
Dyspepsia	183	..	22	..	3	..	34	..
Colica	52	..	3	..	..	..	2	..
Intus-susceptio	1	1	..	..	..	..	..	..
Hæmatemesis	2	..	..	..	..	..	..	..
Hernia	7	..	2	..	..	..	5	..
Hæmorrhois	35	..	9	..	2	..	6	..
Fistula in Ano	4	..	..	..	..	..	1	..
Prolapsus Ani	1	..	..	..	..	..	..	..
Splenitis	1	..	..	..	..	..	..	..
Hepatitis Acuta	11	..	..	..	..	..	2	..
„ Chronica	7	1	3	..	..	..	3	..
Icterus	34	..	6	1	1	..	..	..
5. Urinary:								
Nephritis	3	..	2	..	..	..	..	..
Nephria	8	..	..	..	1	1	1	..
Ischuria	..	..	..	..	..	..	1	..
Hæmaturia	3	..	..	..	..	..	..	..
Cystitis	2	..	..	..	..	..	..	..
Enuresis	2	..	1	..	..	..	..	..
6. Reproductive:								
Varicocele	1	..	..	..	..	..	..	..

Appendix No. XIII—*continued.*

Stations	Canada.		Nova Scotia.		Newfoundland.		Bermuda.	
Average Annual Strength	9,519		3,247		287		1,249	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Hydrocele	5	..	1	..	1	..	1	..
Orchitis (not Gonorrhœal)	73	..	15	..	1	..	20	..
7. Locomotive:								
Arthritis	9	..	..	..	..	..	2	..
Synovitis	7	..	3	..	..	..	2	..
Contractura	2	..	..	..	..	..	1	..
Periostitis	8	..	1	..	..	..	3	..
Exostosis	1	..	..	..	..	..	..	..
Caries	1	..	..	..	..	..	..	..
Necrosis	4	..	1	..	..	..	..	..
8. Integumentary:								
Urticaria	3	..	3	..	..	..	..	..
Eczema	34	..	15	..	..	..	2	..
Herpes	31	..	11	..	..	..	..	..
Impetigo	23	..	..	..	..	..	3	..
Psoriasis	17	..	5	..	..	..	3	..
Lichen	16	..	..	..	..	..	4	..
Ecthyma	1	..	..	..	..	..	2	..
Pityriasis	3	..	..	..	..	..	..	..
Tinea Capitis	7	..	..	..	..	..	..	..
Mentagra	2	..	..	..	..	..	..	..
Lepra	3	..	..	..	..	..	..	..
Pemphigus	1	1	..	..	..	..	..	..
Acne	1	..	..	..	..	..	..	..
Rupia	2	..	..	..	..	..	..	..
Chloasma	1	..	..	..	..	..	..	..
Roseola	1	..	..	..	..	..	..	..
Phlegmon	413	..	90	..	3	..	74	..
Abscessus	120	..	22	..	2	..	15	..
Paronychia	47	..	8	..	..	..	2	..
Ulcus	312	..	80	..	3	..	58	..
IV. *Developmental Diseases.*								
4. Diseases of Nutrition:								
Atrophia	22	..	2	..	..	..	6	..
V. *Violent Deaths or Diseases.*								
1. Accidental:								
Ambustio	71	..	12	..	..	..	7	..
Explosio	4	..	..	..	..	..	..	..
Gelatio	28	2	8	..	1	..	..	..
Insolatio	3	1	..	..	..	..	5	1
Submersio	..	7	..	1	..	..	..	1
Fractura	42	2	21	1	..	..	6	..
Amputatio	1	..	1	1	..	..	..	..
Per Vias Ferreas	..	1	..	..	..	..	..	..
Contusio	449	1	94	..	12	..	62	..
Commotio	..	..	2	..	..	..	..	..
Vulnus Sclopetarium	8	..	1	..	..	..	..	..
„ Incisum	161	..	56	..	6	1	26	..
Luxatura	13	..	2	..	..	..	1	..

Appendix No. XIII—*continued.*

Stations	Canada.		Nova Scotia.		Newfoundland.		Bermuda.	
Average Annual Strength ..	9,519		3,247		287		1,249	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Subluxatio	250	..	57	..	2	..	16	..
Vesiculæ Pedis	42	..	2	..	..	..	11	..
Morsus Hominis	2	..	1	..	..	..	..	..
„ Ursæ	2	..	..	..	..	..	..	..
„ Canis	1	..	..	..	..	..	..	..
3. Homicidal Vulnus Incisum	..	1	..	..	..	..	..	..
4. Suicidal:								
Vulnus Sclopetarium	1	1	..	1	..	..	..	..
„ Incisum	..	2	..	..	..	..	..	..
Suspendium	..	..	..	1	..	..	..	..
5. Executio:	..	1	..	..	..	..	..	..
6. Punitus	33	..	18	..	..	..	9	..
No appreciable disease	15	..	..	..	..	..	..	..
Total	6,811	89	1,603	24	112	4	1,055	28

Causes of the Deaths of the Invalids.

Diseases.	Canada.	Nova Scotia, &c.	Newfoundland.	Bermuda.
Phthisis Pulmonalis ..	2	1	..	2
Abscessus Psoanus ..	2	..	..	..
Morbus Valv: Cordis ..	2	..	..	..
Vulnus Incisum (Suicidal)	1	..	..	..
Total ..	7	1	..	2

APPENDIX No. XIV.

ABSTRACT, showing the Number of Invalids sent Home from British America and of Men finally discharged the service as Invalids in British America and at the Invalid Depôt in England in the Year 1866.

Diseases.	Sent home as Invalids from		Discharged the Service in British America.	Discharged at the Invalid Depôt.	
	British America.	Bermuda.		From British America.	From Bermuda.
I. *Zymotic Diseases.*					
1. Miasmatic:					
Tonsillitis	..	..	..	1	..
Ophthalmia	7	1	..	6	..
Dysenteria Chronica .	..	..	..	1	..
Diarrhœa	1	..	..	..	..
Febris Continua ..	1	..	..	..	..
Rheumatismus Acutus	3	1	..	..	..
„ Chron:	6	..	1	4	..
2. Enthetic:					
Syphilis Secundaria ..	9	2	..	5	1
Orchitis (Gonorrhœal)	1	..	1	..	..
Strictura Urethræ ..	..	..	..	1	..
II. *Constitutional Diseases.*					
1. Diathetic:					
Anæmia	..	1	1	..	..
Anasarca	1	..	..	..	..
Carcinoma	1	..	..	1	..
2. Tubercular:					
Scrofula	4	..	..	3	..
Phthisis Pulmonalis ..	34	13	5	25.	7
Hæmoptysis	1	..	1	..	..
Morbus Coxarius ..	..	..	..	2	1
III. *Local Diseases.*					
1. Nervous:					
Encephalitis	..	2	..	..	..
Paralysis	6	2	1	4	1
Mania	4	..	..	..	..
Amentia	6	..	..	..	..
Epilepsia	6	2	1	1	1
Cephalæa.	3	..	..	4	2
Dysecœa	1	1	..	1	1
Otitis	1	..	..	1	..
Iritis	1	..	..	..	..
Cataractes	1	..	..	..	..
Cæcitas	4	..	2	4	..
2. Circulatory:					
Carditis	..	..	..	1	..
Pericarditis	1	..	..	2	..
Hypertrophia Cordis	2	..	2	2	..
Morbus Valv: „	14	3	1	10	3
Aneurisma Aortæ ..	1	1	1	..	..
Varix	2	..	1	3	..
Arteritis	1	..	..	..	..
3. Respiratory:					
Laryngitis	1	..	..	..	..
Bronchitis Acuta ..	1	..	..	1	..

Appendix No. XIV—*continued.*

Diseases.	Sent home as Invalids from		Discharged the Service in British America.	Discharged at the Invalid Depôt.	
	British America.	Bermuda.		From British America.	From Bermuda.
Bronchitis Chronica..	15	..	2	10	..
Pleuritis	4	..	..	4	..
Pleurodynia	1	..	..	..	..
Pneumonia	7	..	..	..	..
Asthma	1	..	..	..	..
Emphysema	..	..	..	1	..
Epistaxis	1	..	..	1	..
4. Digestive:					
Dyspepsia	1	..	..	1	1
Hernia	3	..	1	3	..
Hæmorrhois	2	..	..	1	..
Fistula in ano ..	1	..	..	1	..
Hepatitis Chronica ..	1	1	1	..	2
Icterus	1	..	..	1	..
5. Urinary:					
Nephria	3	1	1	1	1
Hæmaturia	1	..	..	1	..
6. Reproductive:					
Hydrocele	1	..	..	1	..
Orchitis (not Gonor:)	..	2	1	..	..
7. Locomotive:					
Arthritis	5	1	..	2	..
Synovitis	..	1	..	..	..
Contractura	3	..	..	4	1
Periostitis	1	..	..	..	..
Exostosis	..	..	..	1	..
Necrosis	1	..	..	2	..
8. Integumentary					
Rupia	..	..	..	..	1
Abscessus	3	..	..	1	..
Ulcus..	6	..	1	4	..
IV. *Developmental Diseases.*					
4. Diseases of Nutrition:					
Atrophia	6	2	4	3	..
Deformitas	1	..	1	..	..
V. *Violent Deaths or Diseases.*					
1. Accidental:					
Gelatio	2	..	..	1	..
Fractura	3	..	..	2	..
Amputatio	..	..	..	1	..
Vulnus Sclopetarium	1	..	..	1	..
„ Incisum ..	2	..	..	1	..
Luxatura	1	..	..	1	..
Subluxatio	1	1	..	1	1
Total	204	38	30	134	24

APPENDIX No. XV.

ABSTRACT, showing the Ages of the Troops serving in British America, and the Deaths at each Age during the Year 1866.

Station.	Corps.	Under 20.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
		Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.
Bermuda	Royal Artillery ..	2	..	62	..	73	..	45	1	15	..	..	..	197	1
	Royal Engineers ..	8	..	109	..	97	4	45	4	14	1	4	..	277	9
Canada, Nova Scotia, and Newfoundland.	Royal Artillery ..	35	1	600	9	747	14	527	6	185	4	13	1	2,107	35
	Royal Engineers ..	11	..	84	..	142	1	106	1	37	1	3	..	383	3
	2nd Batt. 7th Foot	28	..	99	..	477	7	127	1	38	1	1	..	770	9
	1st „ 15th „	65	..	278	1	248	4	64	1	37	..	6	..	698	6
	„ „ 16th „	139	..	263	..	237	4	37	2	9	..	5	1	690	7
	„ „ 25th „	50	2	167	..	332	2	107	1	36	..	3	..	695	5
	30th Foot	88	1	211	1	280	..	89	..	37	2	1	..	706	4
	4th Batt. 60th Foot	31	..	167	..	367	1	103	3	15	1	4	..	687	5
	1st Batt. Rifle Brig.	96	..	261	2	226	3	96	2	19	2	..	..	698	9
	4th „ „ „	14	..	119	..	468	2	137	2	34	2	2	..	774	6
	Rl. Canadian Rifles	34	..	22	..	95	3	446	5	418	5	185	3	1,200	16
	Total	601	4	2,442	13	3,789	45	1,929	29	894	19	227	5	9,882	115

APPENDIX No. XVI.

ABSTRACT, showing the Admissions into Hospital and Deaths among the White Troops serving in the Windward and Leeward Command and Jamaica, in the Year 1866.

Stations	Windward and Leeward Command.		Subordinate Stations.						Jamaica.		Subordinate Stations.							
			Barbadoes.		Demerara.		Trinidad.				Newcastle.		Port Royal.		Up Park Camp.		Port Antonio.	
Strength	888		610		87		191		768		459		90		76		40	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. Zymotic Diseases.																		
1. Miasmatic:																		
Tonsillitis	10	..	10	..	..	..	..	..	2	..	2	..	..	..	..	..	..	..
Influenza	6	..	6	..	..	..	..	..	38	..	25	..	..	..	14	..	..	..
Ophthalmia	22	..	17	..	1	..	4	..	10	..	8	..	..	..	..	..	..	..
Erysipelas	..	..	..	..	..	..	..	..	2	..	1	..	1	..	..	..	..	..
Furunculus	19	..	17	..	..	..	2	..	3	..	..	..	..	..	..	..	3	..
Anthrax	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Dysenteria Acuta	14	1	2	..	4	1	8	..	3	..	..	..	..	..	..	..	..	..
„ Chronica	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Diarrhœa	187	..	158	..	3	..	26	..	30	..	11	..	7	..	7	..	2	..
Febris Intermittens	135	1	9	..	75	1	51	..	64	1	21	..	5	..	26	..	4	1
„ Remittens	169	3	25	..	142	3	2	..	80	..	1	..	..	..	36	..	34	..
„ Icterodes	29	16	..	..	29	16	..	..	..	..	..	..	..	..	..	..	..	..
„ Continua	85	1	48	..	8	..	29	1	194	5	67	1	34	..	56	4	30	..
Rheumatismus Acutus	3	..	2	..	..	..	1	..	10	..	6	..	3	..	..	..	..	..
„ Chronicus	18	..	14	..	1	..	3	..	14	..	7	..	4	..	1	..	1	..

| | | |

Appendix No. XVI—*continued.*

Stations	Windward and Leeward Command.		Subordinate Stations. Barbadoes.		Demerara.		Trinidad.		Jamaica.		Subordinate Stations. Newcastle.		Port Royal.		Up Park Camp.		Port Antonio.	
Strength	888		610		87		191		768		459		90		76		40	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Paralysis	..	..	..	..	..	..	..	..	1	1	..	..	..	..	1	1	..	..
Delirium Tremens	1	..	1	..	..	..	..	..	4	..	..	..	3	..	1	..	..	..
Mania	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
Amentia	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epilepsia	3	..	2	..	..	..	1	..	1	..	1	..	..	..	..	..	..	..
Convulsio	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..
Cephalæa	3	..	2	..	..	..	1	..	8	..	6	..	1	..	..	..	..	..
Neuralgia	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
Dysecœa	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
Otitis	13	..	13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2. Circulatory System:																		
Pericarditis	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..
Hypertrophia Cordis	..	..	..	..	..	..	..	..	1	1	1	1	1	..	..	..	..	..
Degeneratio Cordis	1	..	1	..	..	..	..	..	..	2	..	..	..	..	..	..	..	2
Morbus Valvæ Cordis	5	..	4	..	..	..	1	..	2	..	..	..	..	..	..	..	..	..
3. Respiratory System:																		
Laryngitis	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Bronchitis Acuta	15	..	9	..	2	..	4	..	12	..	3	..	1	..	5	..	1	..

| | | |

Appendix No. XVI—*continued.*

Stations	Windward and Leeward Command.		Subordinate Stations. Barbadoes.		Demerara.		Trinidad.		Jamaica.		Subordinate Stations. Newcastle.		Port Royal.		Up Park Camp.		Port Antonio.	
Strength	888		610		87		191		768		459		90		76		40	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
7. Locomotive System:																		
Synovitis	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
Necrosis	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
8. Integumentary System:																		
Urticaria	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..
Eczema	9	..	6	..	..	..	3	..	2	..	..	..	1	..	..	..	1	..
Herpes	37	..	2	..	..	..	35	..	..	..	..	..	..	..	..	..	..	..
Pemphigus	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Phlegmon	60	..	42	..	10	..	8	..	41	..	22	..	1	..	5	..	..	..
Abscessus	22	..	10	..	2	..	10	..	9	..	12	..	2	..	3	..	4	..
Paronychia	10	..	4	..	4	..	2	..	..	..	..	..	..	..	..	..	..	..
Ulcus	69	..	44	..	6	..	19	..	85	..	37	..	17	..	10	..	13	..
IV. *Developmental Diseases.*																		
4. Diseases of Nutrition:																		
Asthenia	7	..	3	..	1	..	3	..	49	..	37	..	3	..	5	..	..	..

V. *Violent Deaths or Diseases.*																				
1. Accidental:																				
Ambustio	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Fractura	3	..	1	..	..	..	2	..	7	..	3	..	..	..	2	..	1	..	..	..
Ruptura Vesicæ	..	..	..	..	..	..	..	..	1	1	..	..	1	1	..	..	..	..	..	..
Contusio	36	..	21	..	2	..	13	..	66	..	42	..	8	..	7	..	5	..	..	..
Commotio	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..
Vulnus Sclopetarium	1	1	..	..	..	..	1	1	2	..	1	..	..	..	..	..	..	..	..	..
„ Incisum	33	..	22	..	2	..	9	..	18	..	9	..	3	..	3	..	3	..	..	..
Luxatura	2	..	1	..	..	..	1	..	4	..	1	..	1	..	1	..	..	..	..	..
Subluxatio	16	..	10	..	1	..	5	..	23	..	18	..	2	..	1	..	..	..	..	..
Vesiculæ Pedis.	1	..	..	..	..	..	1	..	2	..	1	..	1	..	..	..	..	..	..	..
Morsus Serpentis	2	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..
6. Punitus	6	..	5	..	..	..	1	..	5	..	4	..	1	..	1	..	..	..	..	..
Total	1,438	26	776	2	342	22	320	2	1,053	18	494	4	146	2	211	6	124	5	..	..

Causes of Deaths of the Invalids.

	Jamaica.	Windward and Leeward Command.
Diarrhœa	1	..

APPENDIX No. XVII.

ABSTRACT, showing the Admissions into Hospital and Deaths among the Black Troops serving in the Windward and Leeward Command, Jamaica, Honduras, and Bahamas, in the Year 1866.

Stations	Jamaica.		Windward and Leeward Command.		Subordinate Stations. Barbadoes.		Subordinate Stations. Demerara.		Honduras.		Bahamas.	
Average Strength	954		378		247		114		250		273	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*												
1. Miasmatic:												
Variola	2	..	..	..	..	..	..	..	..	..	..	..
Tonsillitis	17	..	8	..	8	..	..	..	..	..	10	..
Influenza	..	..	..	..	..	..	..	..	1	..	..	..
Ophthalmia	38	..	10	..	7	..	3	..	3	..	8	..
Furunculus	..	..	1	..	1	..	..	..	..	..	4	..
Dysenteria Acuta	8	..	4	..	..	..	3	..	1	..	2	..
„ Chronica	1	1	..	..	..	..	..	..	1	..	..	..
Diarrhœa	21	1	11	..	6	..	5	..	2	..	6	..
Febris Intermittens	117	1	14	..	6	..	8	..	9	..	6	..
„ Remittens	88	1	1	..	..	..	1	..	4	1	47	1
„ Continua	71	2	23	1	6	..	17	1	2	..	3	..
Rheumat: Acutus	23	..	9	..	6	..	3	..	4	..	2	..
„ Chron:	76	..	32	..	30	..	2	..	14	..	14	..
2. Enthetic:												
Syphilis Primaria	258	..	42	..	25	..	17	..	20	..	14	..
„ Secundaria	23	..	9	..	5	..	4	..	2	..	3	..
Iritis Syphilitica	1	..	..	..	..	..	..	..	..	..	..	..
Bubo	41	..	11	..	3	..	3	..	1	..	10	..
Gonorrhœa	205	..	31	..	21	..	10	..	18	..	28	..
Phymosis, &c.	6	..	1	..	1	..	..	..	1	..	..	..
Orchitis (Gon:)	4	..	6	..	4	..	2	..	2	..	1	..
Strictura Urethræ	3	..	..	..	..	..	..	..	..	..	2	..
Verrucæ	..	..	1	..	..	..	1	..	..	..	..	..
Ophthalmia (Gon:)	..	..	1	..	..	..	1	..	..	..	..	..
3. Dietic:												
Ebriositas	2	..	4	..	..	..	4	..	..	..	..	..
4. Parasitic:												
Scabies	16	..	1	..	..	..	1	..	..	..	1	..
Tænia Solium	1	..	..	..	..	..	..	..	3	..	..	..
Dracunculus	1	..	2	..	..	..	2	..	..	..	..	..
II. *Constitutional Diseases.*												
1. Diathetic:												
Lumbago	..	..	..	..	..	..	..	..	3	..	3	..
Anasarca	3	..	1	..	1	..	..	..	..	..	2	..
Tumores	4	..	..	..	..	..	..	..	..	..	..	..

Appendix No. XVII—*continued.*

Stations	Jamaica.		Windward and Leeward Command.		Subordinate Stations. Barbadoes.		Subordinate Stations. Demerara.		Honduras.		Bahamas.	
Average Strength	954		378		247		114		250		273	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
2. Tubercular:												
Scrofula	5	1	1	..	1	..	..	..	..	..	6	..
Phthisis Pulmon:	11	7	7	1	6	1	1	..	2	3	5	4
Hæmoptysis	..	1	..	..	..	..	..	..	..	..	1	..
III. *Local Diseases.*												
1. Nervous:												
Meningitis	1	..	1	..	..	..	1	..	..	..	..	..
Apoplexia	1	1	1	2	1	2	..	..	..	..	..	..
Paralysis	1	1	1	1	1	1	..	..	1	2	..	..
Mania	4	..	..	..	..	..	..	..	..	..	..	..
Amentia	..	..	1	..	1	..	..	..	..	..	..	..
Epilepsia	7	1	2	..	2	..	..	..	..	..	3	..
Cephalæa	3	..	2	..	1	..	1	..	1	..	3	..
Neuralgia	2	..	..	..	..	..	..	..	1	..	1	..
Otitis	1	..	..	..	..	..	..	..	2	..	1	..
Nyctalopia	..	..	..	..	..	..	..	..	..	..	1	..
2. Circulatory:												
Hypertrophia cordis	..	..	1	..	1	..	..	..	2	1	..	..
Morbus Valv. Cordis	1	..	..	..	..	..	..	..	..	..	1	..
Aneurisma	..	1	..	..	..	..	..	..	..	..	..	..
3. Respiratory:												
Bronchitis Acuta	41	..	12	..	12	..	..	..	8	1	39	..
,, Chronica	20	1	10	..	7	..	1	..	4	..	9	1
Pleuritis	1	..	..	..	..	..	..	..	1	..	..	..
Hydrothorax	1	..	..	..	..	..	..	..	..	..	..	..
Pneumonia	4	..	1	..	..	..	1	..	..	..	3	..
Asthma	4	..	2	..	1	..	1	..	1	..	..	..
4. Digestive:												
Stomatitis	2	..	..	..	..	..	..	..	..	..	..	..
Gastritis	..	..	..	..	..	..	..	..	1	..	..	..
Enteritis	1	..	..	..	..	..	..	..	..	..	..	..
Obstipatio	5	..	2	..	1	..	1	..	..	..	..	..
Dyspepsia	7	..	4	..	..	..	4	..	..	..	3	..
Colica	3	..	1	..	1	..	..	..	1	..	2	1
Hernia	..	..	..	..	..	..	..	..	..	..	2	..
Hæmorrhois	..	..	..	..	..	..	..	..	1	..	..	..
Hepatitis Chronica	..	..	1	..	..	..	1	..	1	..	..	..
Icterus	3	..	..	..	..	..	..	..	..	..	..	..
Cirrhosis	1	1	..	..	..	..	..	..	..	..	..	..
Ascites	..	..	1	1	1	1	..	..	..	..	..	..
5. Urinary:												
Nephritis	1	..	..	..	..	..	..	..	..	..	..	..
Nephria	3	..	1	..	..	..	1	..	..	..	..	..
Hæmaturia	2	..	..	..	..	..	..	..	..	..	..	..
Dysuria	..	..	2	..	2	..	..	..	..	..	..	..
Morbus Prostaticus	..	..	1	1	1	1	..	..	..	..	..	..

Appendix No. XVII—*continued.*

Stations	Jamaica.		Windward and Leeward Command.		Subordinate Stations. Barbadoes.		Subordinate Stations. Demerara.		Honduras.		Bahamas.	
Average Strength ..	954		378		247		114		250		273	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
6. Reproductive:												
Hydrocele	1	..	2	..	2	..	..	..	..	..	..	..
Orchitis (not Gon:) .	24	..	5	..	5	..	..	..	1	..	3	..
7. Locomotive:												
Arthritis	1	..	..	..	..	..	..	..	..	..	..	..
Synovitis	2	..	..	..	..	..	..	..	..	..	1	..
Contractura	1	..	..	..	..	..	..	..	..	..	..	..
Periostitis.	3	..	..	..	..	..	..	..	..	..	..	..
Caries	1	..	..	..	..	..	..	..	..	..	..	..
Necrosis	1	..	..	..	..	..	..	..	..	..	..	..
8. Integumentary:												
Eczema	1	..	..	..	..	..	..	..	3	..	..	..
Herpes	2	..	..	..	..	..	..	..	..	..	1	..
Impetigo	..	..	..	..	..	..	..	..	3	..	..	..
Psoriasis	..	..	1	..	1	..	..	..	..	..	..	..
Phlegmon	39	..	7	..	1	..	6	..	2	..	1	..
Abscessus	6	..	5	..	4	..	1	..	8	..	3	..
Paronychia	5	..	1	..	..	..	1	..	1	..	2	..
Ulcus	129	..	37	..	22	..	14	..	9	..	19	..
IV. *Developmental Diseases.*												
4. Diseases of Nutrition:												
Atrophia	1	..	2	..	..	..	2	..	..	..	..	..
V. *Violent Deaths or Diseases.*												
1. Accidental:												
Ambustio	..	..	1	..	..	..	1	..	1	..	2	..
Fractura	4	1	1	..	..	..	1	..	1	..	..	..
Contusio	29	..	12	..	4	..	7	..	1	..	3	..
Commotio.	..	..	..	..	..	..	..	..	1	..	..	..
Vulnus Sclopetarium	1	..	..	..	..	..	..	..	..	..	1	..
„ Incisum ..	24	..	12	..	3	..	9	..	10	..	12	..
Subluxatio	12	..	5	..	4	..	1	..	1	..	1	..
Vesiculæ Pedis ..	7	..	..	..	..	..	..	..	9	..	..	..
2. In Battle:												
Vulnus Sclopetarium	..	..	..	..	..	..	..	..	10	5	..	..
6. Punitus	1	..	1	..	1	..	..	..	..	..	..	..
Total	1461	22	370	7	222	6	143	1	179	13	295	7

APPENDIX No. XVIII.

ABSTRACT, showing the diseases of Men sent Home as Invalids from the West Indies in 1866, of those finally discharged the Service at the Invalid Depôt at Netley during the year, and of Black Troops discharged as Invalids in the West Indies and Western Africa.

Diseases.	White Troops.				Black Troops.		
	Sent Home from		Discharged at Invalid Depôt from		Discharged at		
	Jamaica.	West Indies.	Jamaica.	West Indies.	Jamaica.	West Indies.	Africa.
I. *Zymotic Diseases.*							
1. Miasmatic:							
Febris Intermittens	..	1	..	..	..	..	..
Rheumatismus Chronicus	1	..	..	..	4	..	..
2. Enthetic:							
Syphilis Secundaria	2	..	..	..	4	..	..
II. *Constitutional Diseases.*							
1. Diathetic:							
Anæmia	..	..	1	..	..	..	..
2. Tubercular:							
Phthisis Pulmonalis	1	..	2	1	2	2	..
Hæmoptysis	..	1	..	..	..	..	..
III. *Local Diseases.*							
1. Nervous:							
Paralysis	..	..	1	..	..	..	..
Mania	..	..	..	..	1	..	..
Amentia	..	1	..	..	..	..	..
Epilepsia	..	2	1	1	..	..	..
Cephalæa	2	..	..	..	..	..	..
Dysœcea	1	..	..	..	..	..	..
2. Circulatory:							
Morbus Valv: Cordis	1	2	2	1	..	..	..
3. Respiratory:							
Bronchitis Chronica	..	..	1	..	1	..	..
Pneumonia	1	..	1	..	..	..	

Appendix No. XVIII—*continued.*

Diseases.	White Troops.				Black Troops.		
	Sent Home from		Discharged at Invalid Depôt from		Discharged at		
	Jamaica.	West Indies.	Jamaica.	West Indies.	Jamaica.	West Indies.	Africa.
4. Digestive:							
Hæmatemesis	1	..	..	..	..	..	..
Hepatitis Acuta	1	..	..	..	..	..	..
,, Chronica	1	..	..	..	..	..	..
7. Locomotive:							
Arthritis	..	..	..	..	1	..	..
Periostitis	1	..	1	..	..	..	..
Necrosis	..	..	..	..	1	..	..
8. Integumentary:							
Eczema	..	..	..	..	1	..	..
Ulcus	2	..	1	..	..	..	..
IV. *Developmental Diseases.*							
Asthenia	9	3	..	..	2	..	..
V. *Violent Deaths or Diseases.*							
1. Accidental:							
Fractura	..	..	..	..	1	..	..
Contusio	..	..	..	..	1	..	..
Vulnus Sclopetarium	..	..	..	..	1	..	..
Total	24	10	11	3	20	2	..

APPENDIX No. XIX.

ABSTRACT, showing the Admissions into Hospital and Deaths among the Black Troops serving in Western Africa, during the Year 1866.

Stations	Sierra Leone.		Gambia.		Gold Coast.		Lagos.	
Strength	498		210		307		114	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*								
1. Miasmatic:								
Variola	3	..	..	..	..	..	..	..
Varicella	1	..	..	..	..	..	..	..
Tonsillitis	3	..	3	..	..	..	..	..
Influenza	3	..	..	..	..	..	..	..
Ophthalmia	15	..	4	..	10	..	..	..
Furunculus	1	..	..	..	5	..	1	..
Dysenteria Acuta	10	..	8	..	41	2	12	1
„ Chronica	9	1	..	..	2	1	..	..
Diarrhœa	7	..	5	..	37	..	26	..
Febris Intermittens	20	..	32	..	11	..	6	..
„ Remittens	25	..	36	1	63	..	151	2
„ Typhus	1	1	..	..	..	..	..	..
„ Continua	1	..	..	..	..	..	..	..
Rheumatismus Acutus	3	..	4	..	7	..	8	..
„ Chronicus	18	..	9	..	9	..	1	..
2. Enthetic:								
Syphilis Primaria	129	..	15	..	23	..	43	..
„ Secundaria	7	..	5	1	4	..	..	..
Bubo	23	..	9	..	10	..	9	..
Gonorrhœa	102	..	31	..	73	..	24	..
Phymosis, &c.	3	..	1	..	..	..	..	..
Orchitis (Gonorrhœal)	2	..	..	..	..	..	..	..
Strictura Urethræ	1	1	..	..	..	..	..	..
4. Parasitic:								
Scabies	30	..	6	..	6	..	1	..
Tænia Solium	..	..	..	..	3	..	..	..
Dracunculus	31	..	..	..	1	..	4	..
II. *Constitutional Diseases.*								
1. Diathetic:								
Lumbago	..	..	..	..	3	..	..	..
Anæmia	1	..	..	..	..	..	..	..
Anasarca	..	..	1	..	..	..	1	..
Tumores	1	..	..	..	..	..	..	..
2. Tubercular:								
Scrofula	5	..	..	..	..	..	..	..
Phthisis Pulmonalis	6	2	1	2	2	1	3	..
Hæmoptysis	..	..	..	..	5	1	..	..
III. *Local Diseases.*								
1. Nervous:								
Apoplexia	..	..	1	..	..	..	1	..
Paralysis	..	..	..	..	1	1	..	..
Mania	1	..	..	..	..	..	..	..

Appendix No. XIX—*continued.*

Stations	Sierra Leone.		Gambia.		Gold Coast.		Lagos.	
Strength	498		210		307		114	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Epilepsia	..	..	2	..	4	..	1	..
Convulsio	..	..	..	..	1	..	..	..
Cephalæa	3	..	1	..	1	..	1	..
Neuralgia	..	..	..	..	..	..	1	..
Otitis	..	..	..	..	1	..	..	..
Odontalgia	..	..	..	..	..	..	1	..
3. Respiratory:								
Bronchitis Acuta	5	1	7	..	16	..	2	..
„ Chronica	11	1	6	..	6	2	1	..
Pleuritis	2	..	1	..	..	..	..	..
Pleurodynia	..	..	..	..	..	..	1	..
Pneumonia	8	3	3	1	5	..	..	..
Apoplexia Pulmonalis	..	..	..	..	..	..	..	1
4. Digestive:								
Glossitis	..	..	..	..	1	..	..	..
Gastritis	1	1	..	..	..	..	..	..
Peritonitis	1	..	..	..	..	..	..	..
Obstipatio	1	..	..	..	..	..	..	..
Dyspepsia	1	..	1	..	..	..	3	..
Colica	3	..	..	..	3	..	2	..
Hernia	2	..	..	..	..	..	2	..
Hæmorrhois	1	..	..	..	..	..	..	..
Splenitis	1	..	..	..	..	..	..	..
Hepatitis Acuta	..	..	1	..	4	..	..	..
„ Chronica	2	2	..	..	..	..	1	..
Icterus	1	..	..	..	2	..	..	..
Ascites	1	..	..	..	..	..	..	..
5. Urinary:								
Nephritis	..	..	..	..	1	..	2	1
Nephria	..	..	1	1	..	..	1	..
Hæmaturia	2	..	..	..	..	..	..	..
Cystitis	..	..	..	..	1	..	..	..
Enuresis	..	..	..	..	1	..	..	..
6. Reproductive:								
Varicocele	..	..	1	..	..	..	..	..
Hydrocele	..	..	1	..	..	..	..	..
Orchitis (not Gonorrhœal)	9	..	2	..	5	..	7	..
7. Locomotive:								
Arthritis	5	..	1	..	4	1	1	..
Synovitis	3	..	..	..	..	..	..	..
Periostitis	8	..	1	..	..	..	..	..
Necrosis	1	..	..	..	..	..	..	..
8. Integumentary:								
Herpes	..	..	3	..	4	..	..	..
Psoriasis	3	..	..	..	..	..	..	..
Ecthyma	1	..	..	..	..	..	..	..
Sycosis	1	..	..	..	..	..	..	..

Appendix No. XIX—*continued.*

Stations	Sierra Leone.		Gambia.		Gold Coast.		Lagos.	
Strength	498		210		307		114	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Prurigo	..	..	..	..	1	..	..	..
Phlegmon	11	..	5	..	8	..	9	..
Abscessus	24	..	7	..	15	..	2	..
Paronychia	4	..	1	..	1	..	..	..
Ulcus	67	..	29	..	54	..	4	..
IV. *Developmental Diseases.*								
Atrophia	3	..	..	..	1	1	..	..
V. *Violent Deaths or Diseases.*								
1. Accidental:								
Ambustio	3	..	..	..	2	..	..	..
Insolatio	1	..	..	..	..	..	..	..
Submersio	..	1	..	..	..	..	..	..
Fractura	1	..	..	..	..	..	..	..
Amputatio	..	..	..	..	1	1	..	..
Contusio	13	..	7	..	6	..	2	..
Vulnus Sclopetarium	3	..	..	..	1	..	..	..
,, Incisum	16	..	4	..	10	..	3	..
Subluxatio	2	..	1	..	11	..	2	..
Vesiculæ Pedis	..	..	..	..	3	..	..	..
Morsus Hominis	1	..	..	..	..	..	..	..
2. Battle:								
Vulnus Sclopetarium	..	..	13	4	..	..	..	..
4. Suicidal:								
Vulnus Sclopetarium	..	..	..	..	1	1	..	..
Submersio	..	..	..	1	..	..	..	..
6. Punitus	1	..	..	..	2	..	..	..
Cause not specified	..	..	..	..	..	1	..	..
Total	689	14	270	11	499	13	340	5

APPENDIX No. XX.

ABSTRACT, showing the Admissions into Hospital and Deaths among the Troops serving at St. Helena, the Cape of Good Hope, Mauritius and Ceylon, in the year 1866.

Stations	St. Helena.		Cape of Good Hope.		Mauritius.		Ceylon.			
							White.		Black.	
Strength	360		4,135		1,781		886		1,207	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*										
1. Miasmatic:										
Varicella	..	..	2	..	..	..	..	..	3	..
Morbilli	..	..	..	..	..	..	..	..	11	..
Scarlatina	..	..	..	..	1	..	..	..	..	..
Tonsillitis	4	..	63	..	9	..	6	..	1	..
Influenza	..	..	22	..	..	..	2	..	..	..
Ophthalmia	9	..	245	..	93	..	42	..	107	..
Erysipelas	..	..	11	..	2	..	2	..	..	..
Furunculus	4	..	45	..	13	..	15	..	33	..
Anthrax	..	..	..	..	1	..	..	..	..	..
Dysenteria Acuta	1	..	12	1	100	2	95	..	32	4
„ Chronica	6	..	7	2	8	2	12	..	4	1
Diarrhœa	3	..	155	2	57	..	64	..	5	2
Cholera	..	..	1	..	..	..	..	..	..	..
„ Spasmodica	..	..	..	..	..	..	..	..	9	5
Febris Intermittens	1	..	53	..	20	..	22	..	409	..
„ Remittens	..	..	12	..	17	..	94	3	96	1
„ Typhoides	..	..	4	4	4	3	1	..	..	..
„ Continua	12	..	175	4	143	3	124	..	3	..
Rheumatismus Acutus	1	..	147	..	30	..	13	..	76	..
„ Chronicus	4	..	121	..	16	..	3	..	14	..
Parotitis	..	..	..	..	1	..	..	..	2	..
Cynanche Trachealis	..	..	1	..	..	..	..	..	..	..
2. Enthetic:										
Syphilis Primaria	34	..	617	..	141	..	27	..	3	..
„ Secundaria	11	..	171	..	24	..	15	..	1	..
Iritis Syphilitica	..	..	3	..	1	..	..	..	1	..
Bubo	19	..	173	..	30	..	18	..	3	..
Gonorrhœa	23	..	428	..	101	..	55	..	4	..
Phymosis, &c.	..	..	3	..	3	..	1	..	1	..
Orchitis (Gonorrhœal)	..	..	25	..	3	..	4	..	2	..
Strictura Urethræ	..	..	3	..	4	..	3	..	..	..
Verrucæ	..	..	3	..	1	..	..	..	..	..
3. Dietic:										
Scorbutus	..	..	1	..	1	..	1	..	..	..
Purpura	..	..	2	..	..	..	..	..	..	..
Ebriositas	16	..	71	2	66	..	41	..	1	..
Bronchocele	..	..	..	..	1	..	..	..	..	..

Appendix No. XX—*continued.*

Stations	St. Helena.		Cape of Good Hope.		Mauritius.		Ceylon. White.		Ceylon. Black.	
Strength	360		4,135		1,781		886		1,207	
Diseases.	Admitted.	Died	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
4. Parasitic:										
Porrigo	..	..	7	..	..	..	..	..	1	..
Scabies	2	..	10	..	..	..	1	..	24	..
Tænia Solium	..	..	11	..	4	..	1	..	..	..
Vermes	..	..	6	..	..	..	..	..	..	..
Ascaris Lumbricoides	..	..	..	..	..	..	..	..	1	..
II. Constitutional Diseases.										
1. Diathetic:										
Lumbago	2	..	8	..	..	..	..	..	..	..
Anæmia	..	..	9	..	..	..	8	..	2	..
Anasarca	..	..	2	..	1	..	..	..	5	1
Tumores	..	..	3	..	..	..	1	..	..	..
Podagra	..	..	1	..	..	..	..	..	..	..
Carcinoma	..	..	..	..	..	..	..	..	2	..
2. Tubercular:										
Scrofula	..	..	8	..	1	..	3	..	1	..
Phthisis Pulmonalis	2	..	29	8	8	2	10	1	2	2
Hæmoptysis	2	..	2	..	..	..	3	..	1	..
III. Local Diseases.										
1. Nervous:										
Apoplexia	..	..	1	..	1	1	1	1	..	..
Paralysis	..	..	7	1	2	..	..	..	3	..
Delirium Tremens	1	..	25	..	5	..	12	2	..	..
Mania	1	..	3	..	3	..	3	..	1	..
Amentia	..	..	10	..	..	..	1	..	3	..
Epilepsia	..	..	22	..	..	..	..	..	..	..
Cephalæa	7	..	15	..	1	..	5	..	1	..
Neuralgia	..	..	3	..	2	..	1	..	..	..
Dysecœa	..	..	1	..	..	..	..	..	..	..
Otitis	5	..	8	..	8	..	18	..	2	..
Hysteria	..	..	1	..	..	..	..	..	..	..
Odontalgia	..	..	..	..	..	..	..	..	2	..
Cæcitas	..	..	1	..	..	..	1	..	..	..
Chorea	..	..	..	..	..	..	4	..	..	..
Tetanus	..	..	..	..	..	..	..	..	1	1
Abscessus Cerebri	..	..	..	..	..	..	..	1	..	..
2. Circulatory:										
Carditis	..	..	1	..	..	..	..	..	..	..
Pericarditis	..	..	2	..	..	..	..	..	..	..
Hypertrophia Cordis	..	..	14	1	6	1	5	..	..	..
Morbus Valv: „	7	1	33	2	1	..	7	1	1	..
Aneurisma Aortæ	..	..	5	5	..	..	..	..	..	..
„	..	..	6	..	..	..	..	..	..	..
Varix	..	..	2	..	2	..	6	..	..	..

Appendix No. XX—*continued.*

Stations	St. Helena.		Cape of Good Hope.		Mauritius.		Ceylon. White.		Ceylon. Black.	
Strength	360		4,135		1,781		886		1,207	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Palpitatio	4	..	1	..	2	..	..	..	..	..
Angina Pectoris	..	..	..	..	1	..	1	..	..	..
Morbus Cordis	..	..	3	..	..	..	..	..	..	..
3. Respiratory:										
Laryngitis	..	..	..	..	1	..	..	..	..	..
Bronchitis Acuta	16	..	83	..	53	..	42	..	34	..
„ Chronica	..	..	31	..	9	..	4	..	6	..
Pleuritis	1	..	7	..	3	..	5	..	2	..
Pneumonia	2	..	24	2	..	..	1	..	3	..
Asthma	..	..	1	..	4	..	1	..	24	..
Epistaxis	..	..	3	..	..	..	..	..	..	..
Pleurodynia	..	..	..	..	3	..	..	..	..	..
Emphysema	..	..	..	..	1	..	..	..	..	..
4. Digestive:										
Pharyngitis	..	..	2	..	..	..	..	..	..	..
Stomatitis	..	..	1	..	..	..	1	..	1	..
Enteritis	..	..	1	..	1	1	..	..	1	..
Peritonitis	..	..	..	..	1	1	..	..	..	..
Obstipatio	1	..	2	..	3	..	..	..	2	..
Dyspepsia	12	..	96	..	28	..	23	..	6	..
Colica	..	..	19	1	6	..	1	..	48	..
Hæmatemesis	..	..	2	1	..	..	1	..	..	..
Hernia	..	..	7	..	2	..	..	..	..	..
Hæmorrhois	2	..	20	..	8	..	4	..	3	..
Fistula in ano	..	..	7	..	3	..	3	..	1	..
Splenitis	..	..	4	..	..	..	1	..	..	..
Hepatitis Acuta	1	..	17	2	29	4	27	5	2	..
„ Chronica	..	..	11	1	6	..	12	..	..	..
Icterus	2	..	3	..	5	..	..	..	..	..
Ascites	..	..	1	..	..	..	..	..	..	..
5. Urinary:										
Ischuria	..	..	..	..	..	..	..	..	1	..
Lithiasis	..	..	..	..	..	..	3	..	1	..
Cystitis	..	..	2	..	..	..	..	..	..	..
Fistula in Perineo	..	..	2	..	..	..	..	..	..	..
Enuresis	1	..	..	..	1	..	..	..	..	..
6. Reproductive:										
Hydrocele	..	..	4	..	1	..	..	..	..	..
Orchitis (not Gonorrhœal)	5	..	55	..	11	..	19	..	5	..
7. Locomotive:										
Arthritis	..	..	2	..	..	..	..	..	2	..
Synovitis	..	..	1	..	2	..	..	..	1	..
Periostitis	..	..	2	..	1	..	..	..	1	..
Caries	..	..	5	..	..	..	..	..	..	..
Necrosis	..	..	5	..	1	..	..	..	..	..

Appendix No. XX—*continued.*

Stations	St. Helena.		Cape of Good Good		Mauritius.		Ceylon.			
							White.		Black.	
Strength	360		4,135		1,781		886		1,207	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
8. Integumentary System:										
Urticaria	..	..	2	..	..	..	..	..	..	..
Eczema	1	..	12	..	4	..	2	..	2	..
Herpes	1	..	9	..	2	..	3	..	2	..
Impetigo	..	..	5	..	..	..	..	..	..	..
Psoriasis	1	..	11	..	1	..	..	..	2	..
Lichen	1	..	..	..	..	..	1	..	..	..
Tinea Capitis	1	..	..	..	..	..	..	..	..	..
Ecthyma	..	..	1	..	..	..	..	..	..	..
Lepra	..	..	1	..	..	..	..	..	..	..
Acne	..	..	..	..	1	..	1	..	..	..
Phlegmon	..	..	189	..	27	..	23	..	20	..
Abscessus	1	..	60	..	30	..	36	..	25	..
Paronychia	..	..	35	..	2	..	3	..	9	..
Ulcus	8	..	185	..	34	..	97	..	97	..
IV. *Developmental Diseases.*										
4. Diseases of Nutrition:										
Atrophia	..	..	9	..	3	..	8	1	1	..
V. *Violent Deaths or Diseases.*										
1. Accidental:										
Ambustio	2	..	13	..	2	..	1	..	3	..
Insolatio	..	..	..	..	..	..	3	1	..	..
Submersio	..	1	..	..	..	2	..	1	..	..
Fractura	1	..	17	..	6	..	2	..	1	..
Amputatio	..	..	2	..	..	..	..	..	..	..
Contusio	20	..	255	1	58	..	43	..	48	..
Commotio	..	..	1	1	1	..	..	1	..	..
Vulnus Sclopetarium	..	..	1	..	..	..	1	..	..	..
„ Incisum	4	..	54	..	22	..	16	..	26	..
Luxatura	..	..	6	..	4	..	..	..	1	..
Subluxatio	3	..	58	..	19	..	27	..	21	..
Vesiculæ Pedis	11	..	15	..	5	..	8	..	3	..
Venenatio	..	..	1	..	..	..	..	..	..	..
Morsus Serpentis	..	..	..	..	..	..	..	..	1	..
„ Hominis	..	..	..	..	1	..	..	..	..	..
4. Suicidal:										
Vulnus Incisum	1	1	..	..	..	..	..	..	..	..
„ Sclopetarium	..	..	1	..	..	..	..	..	..	..
6. Punitus	1	..	16	..	6	..	2	..	3	..
Total	281	3	4,215	41	1,350	22	1,177	18	1,366	17

Appendix No. XX—*continued.*

CAUSES of the Deaths of the Invalids.

	St. Helena.	Cape.	Mauritius.	Ceylon.
				White.
Phthisis Pulmonalis	..	1	1	..
Dysenteria Chronica	..	..	1	1
Paralysis	..	1	..	..
Bronchitis	..	1	1	..
Total	..	3	3	1

APPENDIX No. XXI.

ABSTRACT, showing the Number of Men sent home from St. Helena, the Cape of Good Hope, Mauritius, and Ceylon, in 1866, as Invalids, and of Invalids finally discharged the Service in these Colonies and in England.

Diseases.	St. Helena.		Cape.			Mauritius.		Ceylon.		
								White.		Black.
	Sent Home.	Discharged at Netley.	Sent Home.	Discharged in the Colony.	Discharged at Netley.	Sent Home.	Discharged at Netley.	Sent Home.	Discharged at Netley.	Discharged in the Colony.
I. *Zymotic Diseases.*										
1. Miasmatic:										
Ophthalmia	1	..	3	..	6	9	5	1	1	..
Dysenteria Chronica	3	..	1	..	..	13	3	10	..	1
Diarrhœa	..	..	1	..	..	..	..	2	..	..
Febris Intermittens	..	..	1	..	1	..	..	..	..	1
„ Remittens	..	..	..	..	..	..	..	2	..	..
„ Continua	2	..	..	..	..	1	..	..	..	..
Rheumatismus Acutus	..	..	..	..	..	..	..	1	..	..
„ Chronicus	2	1	11	..	4	1	2	..	..	4
2. Enthetic:										
Syphilis Secundaria	..	..	5	1	5	3	2	2	..	..
Gonorrhœa	..	1	..	..	..	..	..	..	..	..
Strictura Urethræ	..	..	..	1	..	..	..	..	..	..
II. *Constitutional Diseases.*										
1. Diathetic:										
Anæmia	..	..	..	..	..	..	..	1	..	..
Anasarca	..	..	..	..	..	..	..	..	..	1
Tumores	..	..	4	..	..	..	..	..	..	..
2. Tubercular:										
Scrofula	..	..	1	..	7	..	..	..	..	..
Phthisis Pulmonalis	5	2	4	..	7	5	2	4	3	..
Hæmoptysis	1	..	..	..	..	..	..	1	..	..
III. *Local Diseases.*										
1. Of the Nervous Syst.:										
Paralysis	..	..	..	..	1	2	2	..	1	1
Mania	1	..	..	..	..	3	..	1	..	..
Amentia	..	..	2	..	..	..	..	..	1	1
Cephalœa	1	..	..	..	..	..	..	..	..	..
Chorea	..	..	..	..	..	..	..	1	..	..
Dysecœa	..	..	..	1	..	1	..	..	..	..
Otitis	..	..	..	..	..	..	..	1	1	..
Cataractes	..	1	..	..	..	..	..	..	..	..
Cæcitas	..	..	..	..	..	..	..	2	..	..
2. Circulatory System:										
Carditis	..	1	..	..	..	..	..	..	..	..
Hypertrophia Cordis	1	2	..	..	..	2	1	2	..	..
Morbus Valv: „	7	2	8	..	9	1	1	1	..	..
Aneurisma Aortæ	..	..	1	..	..	..	..	..	..	..
Aneurisma	..	..	..	..	1	..	..	..	..	..
Varix	4	3	..	..	..	..	..	..	..	..
Palpitatio	2	1	4	..	3	..	..	..	..	..

Appendix No. XXI—*continued.*

Diseases.	St. Helena.		Cape.			Mauritius.		Ceylon.		
								White.		Black.
	Sent Home.	Discharged at Netley.	Sent Home.	Discharged in the Colony.	Discharged at Netley.	Sent Home.	Discharged at Netley.	Sent Home.	Discharged at Netley.	Discharged in the Colony.
Morbus Cordis	..	..	1	..	..	..	..	..	..	..
Phlebitis	..	..	..	..	..	..	..	..	..	1
Angina Pectoris	..	..	..	..	..	..	..	..	3	..
3. Respiratory System:										
Bronchitis Chronica ..	1	..	6	1	5	1	1	4	2	3
Pleuritis	1	1	..	..	..	..	..	..	..	..
Asthma	..	..	1	..	..	1	..	..	..	..
4. Of the Digestive Syst.:										
Dyspepsia	2	..	..	..	..	1	..	..	..	..
Hernia	..	..	2	..	2	1	1	..	1	1
Fistula in Ano	..	..	..	..	..	..	..	1	..	..
Splenitis	..	..	..	..	1	..	..	..	..	..
Hepatitis	..	..	..	..	1	2	4	4	5	..
5. Of the Urinary Syst:										
Fistula in Perineo ..	1	..	1	..	..	..	..	..	..	..
Nephritis	..	..	..	..	..	..	1	..	..	..
Enuresis	..	..	..	..	..	..	1	..	..	..
6. Of the Reproductive System:										
Hydrocele	..	..	..	..	..	..	..	..	1	..
Orchitis (not Gonorrhœal)	..	..	..	..	1	..	..	..	..	..
7. Of the Locomotive Syst:										
Arthritis	..	1	..	..	..	..	1	..	1	..
Synovitis	1	..	..	..	..	..	..	..	..	..
Contractura	..	..	1	..	..	..	..	..	..	..
Caries	..	..	4	..	2	..	..	..	..	..
Necrosis	..	..	..	..	1	..	..	..	..	..
8. Of the Integumentary System:										
Abscessus	..	..	1	..	1	..	..	..	..	..
Ulcus	..	..	2	..	3	..	..	..	..	1
IV. *Developmental Diseases.*										
4. Diseases of Nutrition:										
Atrophia	5	..	2	..	4	1	2	1	..	2
V. *Violent Deaths or Diseases.*										
1. Accidental:										
Vulnus Incisum	..	..	..	..	..	1	..	..	..	..
Fractura	..	..	2	..	2	1	2	..	..	..
Luxatura	..	..	..	1	..	2	..	..	..	..
Subluxatio	..	..	..	..	..	..	..	1	..	..
Total	41	16	70	4	68	54	31	43	20	17

APPENDIX No. XXII.

ABSTRACT, showing the Ages of the Troops serving at the Cape of Good Hope, and the Deaths at each Age, during the Year 1866.

Age	Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
Royal Artillery ..	3	..	21	..	62	1	51	..	21	..	2	..	160	1
„ Engineers ..	7	..	30	..	76	..	64	..	25	..	4	..	206	..
2nd Batt. 5th Foot ..	154	..	416	1	127	7	38	1	10	..	..	..	745	9
1st „ 9th „ ..	52	..	137	1	301	3	89	1	49	2	9	..	637	7
1st „ 10th „ ..	37	..	226	2	159	..	62	2	43	1	11	..	538	5
99th Foot	30	..	114	..	367	3	132	..	31	2	6	..	680	5
Cape Mounted Rifles	247	..	163	2	80	..	42	..	28	1	8	..	518	3
Total	530	..	1,107	6	1,122	14	478	4	207	6	40	..	3,484	30

APPENDIX No. XXIII.

ABSTRACT, showing the Ages of the Troops serving at the Mauritius, and the Deaths at each Age, during the Year 1866.

Age	Under 20.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and Upwards.		Total.	
	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.
Royal Artillery	2	..	50	..	87	1	62	1	25	..	1	..	227	2
2nd Batt. 13th Foot	38	..	107	..	423	10	126	..	34	..	2	..	730	10
2nd „ 22nd „	26	..	94	1	441	5	147	1	48	1	2	..	758	8
Total	66	..	251	1	951	16	335	2	107	1	5	..	1,715	20

APPENDIX No. XXIV.

ABSTRACT, showing the Ages of the Troops serving in Ceylon, and the Deaths at each Age, during the Year 1866.

Age . .	Under 20 Years.		20 and under 25		25 and under 30		30 and under 35		35 and under 40		40 and upwards.		Total.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
Royal Artillery ..	3	..	24	..	22	..	33	..	9	1	..	..	91	1
2nd Bn. 25th Foot.	35	..	448	6	156	8	83	2	19	1	1	..	742	17
Total ..	38	..	472	6	178	8	116	2	28	2	1	..	833	18

APPENDIX No. XXV.

ABSTRACT, showing the Admissions into Hospital and Deaths among the Troops serving in Australia, New Zealand, China, and Japan, during the year 1866.

Stations	Australia.		New Zealand.		China.				Japan.	
					White.		Black.			
Strength	547		5,598		869		285		887	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*										
1. Miasmatic:										
Variola	..	..	..	..	1	..	8	1	13	..
Morbilli	1	..	..	..	..	..	..	..	..	..
Tonsillitis	6	..	47	..	11	..	3	..	20	..
Influenza	..	..	82	..	..	..	..	..	10	..
Ophthalmia	37	..	264	..	18	..	12	..	73	..
Erysipelas	1	..	2	..	1	..	..	..	..	..
Furunculus	4	..	24	..	3	..	4	..	10	..
Anthrax	..	..	2	..	..	..	..	..	..	..
Dysenteria Acuta	3	..	10	..	21	3	41	2	2	..
„ Chronica.	..	..	5	1	2	4	..	..	..	..
Diarrhœa	15	..	138	..	121	1	41	1	28	1
Cholera Simplex	..	..	4	..	..	..	..	..	1	1
„ Spasmodica	..	..	..	..	2	1	..	..	..	..
Febris Intermittens	2	..	4	..	527	..	99	1	147	..
„ Remittens	2	..	1	..	284	3	10	1	1	..
„ Typhoides	1	..	6	3	..	..	..	..	..	..
„ Continua	1	..	139	1	391	2	189	3	92	5
Rheumat: Acutus	8	..	42	..	22	..	35	..	28	..
„ Chronicus	9	..	39	..	18	..	1	..	43	..
Parotitis	1	..	..	..	..	..	3	..	..	..
Diphtheria	..	..	..	..	..	..	1	1	..	..
2. Enthetic:										
Syphilis Primaria	15	..	11	..	84	..	26	..	224	..
„ Secundaria	3	..	29	1	37	..	2	..	42	..
Iritis Syphilitica	..	..	..	..	2	..	1	..	9	..
Bubo	7	..	1	..	28	..	8	..	48	..
Gonorrhœa	48	..	74	..	81	..	9	..	160	..
Phymosis, &c.	..	..	2	..	4	..	..	..	3	..
Orchitis (Gonorr:)	1	..	4	..	8	..	..	..	15	..
Strictura Urethræ	4	..	12	1	1	..	1	..	1	..
3. Dietic:										
Scorbutus	..	..	..	..	1	..	..	..	..	..
Purpura	..	..	1	..	..	..	..	..	..	..
Ebriositas	23	..	68	1	28	..	..	..	12	..
4. Parasitic:										
Porrigo	..	..	1	..	..	..	..	..	..	..
Scabies	2	..	30	..	1	..	9	..	4	..
Tænia Solium	..	..	1	..	1	..	..	..	..	..

Appendix No. XXV—*continued.*

Stations	Australia.		New Zealand.		China. White.		China. Black.		Japan.	
Strength	547		5,598		869		285		887	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
II. *Constitutional Diseases.*										
1. Diathetic:										
Podagra	4	..	..	..	..	..	..	..	..	..
Lumbago	3	..	9	..	..	..	..	..	2	..
Anæmia	..	..	1	..	..	..	2	..	..	..
Anasarca	..	..	..	..	2	1	1	..	1	..
Tumores	..	..	4	..	..	..	..	..	..	..
2. Tubercular:										
Scrofula	..	..	4	..	2	..	..	..	5	..
Phthisis Pulmonalis	5	2	40	2	8	..	1	2	7	2
Hæmoptysis	..	..	1	..	2	..	..	..	2	..
III. *Local Diseases.*										
1. Nervous Syst.:										
Encephalitis	..	..	3	2	1	1	..	..	..	..
Apoplexia	..	..	1	1	1	1	..	..	3	1
Paralysis	..	..	4	..	3	..	..	..	5	..
Delirium Tremens	1	..	7	2	4	1	..	..	..	..
Mania	..	..	1	..	..	..	..	..	..	..
Amentia	2	..	4	1	1	..	1	..	..	..
Epilepsia	1	..	1	..	3	..	..	..	1	..
Convulsio	..	..	1	..	..	..	..	..	..	..
Hysteria	1	..	..	..	..	..	..	..	..	..
Cephalæa	4	..	16	..	3	..	..	..	5	..
Neuralgia	2	..	11	..	3	..	1	..	2	..
Dysecœa	..	..	1	..	..	..	..	..	..	..
Otitis	..	..	17	..	6	..	..	..	5	..
Polypus Auris	..	..	1	..	..	..	..	..	..	..
Amaurosis	..	..	1	..	..	..	..	..	..	..
Rabies	..	..	..	..	1	1	..	..	..	..
2. Circulatory Syst.:										
Pericarditis	..	..	1	..	..	..	..	..	..	..
Hypertrophia cordis	7	..	2	..	1	1	..	..	..	..
Morbus Valv: „	..	1	22	10	5	..	..	..	1	2
Angina Pectoris	..	..	..	..	1	..	..	..	..	..
Aneurisma Aortæ	..	1	8	7	..	..	..	..	..	..
Aneurisma	..	..	..	1	..	..	..	..	..	..
Varix	..	..	2	..	2	..	..	..	..	..
3. Respiratory Syst.:										
Laryngitis	1	..	2	..	..	..	..	..	..	..
Bronchitis Acuta	27	..	195	1	32	..	16	..	28	..
„ Chronica	7	..	24	..	2	..	1	..	..	..
Pleuritis	2	..	18	1	..	..	1	..	1	..
Hydrothorax	..	..	1	..	..	..	..	..	..	..
Pleurodynia	..	..	4	..	..	..	..	..	..	..
Pneumonia	4	..	14	2	2	..	1	..	5	2
Asthma	..	..	1	..	1	..	3	..	..	..
Emphysema	..	..	1	..	..	..	..	..	..	..
Epistaxis	..	..	2	..	3	..	..	..	..	..

Appendix No. XXV—*continued.*

Stations	Australia.		New Zealand.		China.				Japan.	
					White.		Black.			
Strength	547		5,598		869		285		887	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
4. Digestive Syst.:										
Stomatitis	..	..	1	..	..	..	..	..	..	..
Ranula	..	..	1	..	..	..	..	..	..	..
Gastritis	..	..	6	..	..	..	..	..	..	..
Enteritis	..	..	1	1	..	..	..	..	..	..
Obstipatio	1	..	6	..	3	..	2	..	1	..
Dyspepsia	11	..	63	..	5	..	..	..	6	..
Colica	4	..	14	..	1	..	5	..	2	..
Gastralgia	..	..	1	..	..	..	..	..	..	..
Hæmatemesis	..	..	..	..	1	..	..	..	..	..
Hernia	2	..	4	..	..	..	..	..	..	..
Hæmorrhois	3	..	24	..	6	..	..	..	4	..
Fistula in Ano	1	..	4	..	1	..	..	..	3	..
Prolapsus Ani	..	..	..	..	..	..	1	..	..	..
Splenitis	..	..	1	..	7	1	1	..	5	..
Hepatitis Acuta	1	..	13	..	15	1	..	..	4	..
„ Chronica	2	..	13	1	2	..	1	..	3	..
Icterus	3	..	11	..	1	..	..	..	2	1
Ascites	1	..	1	..	..	..	..	..	..	..
5. Urinary Syst.:										
Nephritis	..	..	1	..	2	..	..	..	2	..
Nephria	..	..	1	..	2	..	..	..	2	..
Ischuria	..	..	1	..	1	..	1	..	..	..
Dysuria	..	..	..	..	..	..	..	..	1	..
Hæmaturia	1	..	1	..	..	..	..	..	..	..
Lithiasis	..	..	1	..	..	..	..	..	..	..
Fistula in Perineo	..	..	..	..	..	..	..	..	1	..
Enuresis	1	..	3	..	1	..	..	..	..	..
Diabetes	..	..	1	..	1	1	..	..	..	..
6. Reproductive System:										
Hydrocele	..	..	4	..	1	..	..	..	2	..
Orchitis (not Gon:)	5	..	30	..	11	..	4	..	16	..
7. Locomotive Syst:										
Arthritis	..	..	1	..	2	..	2	..	..	..
Synovitis	..	..	10	..	5	..	..	..	5	..
Hydrarthrus	..	..	3	..	..	..	..	..	..	..
Contractura	..	..	1	..	..	..	..	..	..	..
Periostitis	..	..	..	..	1	..	..	..	3	..
Exostosis	..	..	1	..	..	..	..	..	..	..
8. Integumentary System:										
Urticaria	..	..	3	..	..	..	..	..	..	..
Eczema	1	..	11	..	5	..	..	..	4	..
Herpes	..	..	8	..	12	..	1	..	..	..
Impetigo	..	..	2	..	1	..	..	..	..	..
Psoriasis	..	..	7	..	..	..	..	..	..	..

Appendix No. XXV—*continued.*

Stations	Australia.		New Zealand.		China. White.		China. Black.		Japan.	
Strength	547		5,598		869		285		887	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Lichen	..	..	2	..	..	..	..	..	..	..
Acne	..	..	1	..	..	..	..	..	1	..
Pemphigus	..	..	..	..	..	..	..	..	1	..
Mentagra	..	..	1	..	..	..	..	..	..	..
Pityriasis	..	..	2	..	..	..	..	..	..	..
Lepra	..	..	3	..	..	..	..	..	..	..
Rupia	..	..	..	..	1	..	..	..	3	..
Phlegmon	8	..	96	..	36	..	6	..	40	..
Abscessus	3	..	41	1	12	..	4	..	5	..
Paronychia	4	..	22	..	..	..	..	..	..	..
Ulcus	15	..	94	..	41	..	15	..	52	..
IV. *Developmental Diseases.*										
4. Diseases of Nutrition:										
Atrophia	..	..	..	..	21	..	11	..	4	..
V. *Violent Deaths or Diseases.*										
1. Accidental:										
Ambustio	1	..	22	..	5	..	1	..	7	..
Insolatio	..	..	1	..	1	1	..	..	..	..
Submersio	..	..	1	6	..	1	..	..	..	3
Asphyxia	..	..	..	1	..	..	..	..	..	..
Fractura	2	..	27	2	5	1	1	..	2	..
Amputatio	..	..	2	..	..	..	..	..	..	..
Contusio	31	..	180	..	26	..	6	..	54	..
Commotio	..	..	2	..	..	..	..	..	..	..
Vulnus Sclopetarium	..	..	5	..	..	..	..	..	..	..
„ Incisum	21	..	69	..	23	..	5	..	24	..
Luxatura	..	..	8	..	..	..	..	..	..	..
Subluxatio	20	..	111	..	26	..	4	..	33	..
Vesiculæ Pedis	1	..	16	..	..	..	..	..	3	..
Venenatio	..	..	..	..	1	1	..	..	..	..
Morsus Canis	..	..	..	..	1	..	..	..	..	..
2. In Battle:										
Prælio Occisi	..	..	..	8	..	..	..	..	..	..
Vulnus Sclopetarium	..	..	24	6	..	..	..	..	..	..
4. Suicidal:										
Venenatio	..	..	1	..	..	..	..	..	..	..
Luxatura	..	..	..	..	..	1	..	..	..	1
Vulnus Incisum	..	..	..	..	..	..	..	..	4	..
6. Punitus	..	..	55	..	..	..	..	..	1	..
Simulatio Morbi	..	..	..	..	..	..	..	..	..	..
Total	408	4	2,508	64	2,073	28	605	12	1,359	19

Appendix No. XXV—*continued.*

CAUSES of the Deaths of the Invalids.

	Australia.	New Zealand.	China.
Dysenteria	..	..	5
Diarrhœa	..	..	2
Scorbutus	..	..	1
Anæmia	..	..	1
Phthisis Pulmonalis	1	3	1
Epilepsia..	..	1	..
Aneurisma	..	3	..
Nephritis..	..	1	..
Total	1	8	10

APPENDIX No. XXVI.

ABSTRACT, showing the Number of Men sent home from Australasia and China, in 1866, as Invalids, and the Number discharged the Service as Invalids in Australasia and in England.

Stations	Australasia.			China & Japan.	
Diseases.	Sent Home as Invalids.	Discharged the Service— In Colony.	Discharged the Service— In England.	Sent Home as Invalids.	Discharged in England.
I. *Zymotic Diseases.*					
1. Miasmatic:					
Ophthalmia	9	..	13	1	2
Dysenteria Acuta	1	..	..	4	..
„ Chronica	2	..	1	..	5
Diarrhœa	..	..	1	5	4
Febris Intermittens	..	..	..	100	27
„ Remittens	..	..	..	8	11
„ Continua	..	..	..	..	2
Rheumatismus	4	1	9	2	1
2. Enthetic:					
Syphilis Secundaria	2	..	5	3	4
Iritis Syphilitica	..	..	..	1	..
Gonorrhœa	..	..	..	1	..
Orchitis (Gonorrhœal)	..	..	..	1	..
Strictura Urethræ	..	..	1	..	..
4. Parasitic:					
Acephalocystis	..	..	1	..	..
II. *Constitutional Diseases.*					
1. Diathetic:					
Podagra	1	..	..	..	..
Anasarca	..	..	..	1	2
Tumores	1	..	..	..	..
2. Tubercular:					
Scrofula	3	..	2	1	1
Phthisis Pulmonalis	15	..	31	4	6
Hæmoptysis	..	..	..	1	..
III. *Local Diseases.*					
1. Nervous Syst.:					
Encephalitis	1	..	..	..	..
Paralysis	3	..	4	2	1
Mania	1	..	..	..	..
Amentia	2	..	..	1	..
Epilepsia	3	..	5	1	..
Cephalæa	..	..	2	..	..
Otitis	..	..	1	..	..
Cæcitas	1	..	5	..	..
Cataractes	..	..	1	..	..

Appendix No. XXVI—*continued.*

Stations	Australasia.			China & Japan.	
Diseases.	Sent Home as Invalids.	Discharged the Service— In Colony.	Discharged the Service— In England.	Sent Home as Invalids.	Discharged in England.
2. Circulatory Syst.:					
Pericarditis	..	..	1	..	..
Hypertrophia Cordis	3	..	4	..	..
Morbus Valv: Cordis	3	..	9	1	2
Aneurisma Aortæ	2	..	..	..	..
Varix	..	..	1	..	2
3. Respiratory Syst.:					
Bronchitis	3	2	2	2	..
Pleuritis	1	..	1	..	1
Hydrothorax	1	..	..	..	..
Pneumonia	..	..	..	..	1
4. Digestive Syst.:					
Gastritis	1	..	..	..	..
Dyspepsia	2	..	2	..	..
Hernia	1	1	..	..	..
Hæmorrhois	..	1	..	..	..
Fistula in Ano	1	..	..	..	..
Splenitis	..	..	..	5	..
Hepatitis	3	..	5	9	10
5. Urinary Syst.:					
Nephria	1	..	4	..	..
Diabetes	1	..	1	..	..
6. Reproductive Syst.:					
Orchitis (not Gonorrhœal)	..	..	..	1	..
7. Locomotive Syst.:					
Arthritis	..	..	3	..	..
Contractura	..	..	..	..	1
Exostosis	1	..	..	..	..
8. Integumentary Syst.:					
Rupia	..	..	..	1	..
Abscessus	..	..	..	2	..
Ulcus	1	1	1	2	..
IV. *Developmental Diseases.*					
4. Diseases of Nutrition:					
Atrophia	1	..	3	..	3
V. *Violent Deaths or Diseases.*					
1. Accidental:					
Insolatio	..	..	..	..	1
Fractura	1	..	2	..	1
Amputatio	..	..	4	..	..
Vulnus Sclopetarium	2	..	..	..	..
„ Incisum	1	..	..	..	..
Luxatura	1	..	..	..	..
2. In Battle:					
Vulnus Sclopetarium	6	..	27	..	..
Total	86	6	152	160	88

APPENDIX No. XXVII.

ABSTRACT, showing the Ages of the Men serving in Australasia, and the Deaths in each Quinquennial Period of Life, during the Year 1866.

Age	Under 20.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
Royal Artillery ..	..	..	41	..	98	1	60	1	14	1	2	..	215	3
Military Train ..	2	..	39	..	138	2	76	1	16	..	4	..	275	3
2nd Batt. 14th Foot	30	..	133	..	300	5	447	4	104	..	..	..	1,014	9
2nd „ 18th „	26	..	316	..	439	4	98	1	27	1	..	..	906	6
57th Foot	14	..	163	2	408	11	156	2	108	2	17	..	866	17
Total	72	..	692	2	1,383	23	837	9	269	4	23	..	3,276	38

APPENDIX No. XXVIII.

ABSTRACT, showing the Admissions into Hospital and Deaths among Her Majesty's European Troops serving in Bengal, Madras, and Bombay during the Year 1866.

Stations	Bengal.		Madras.		Bombay.	
Average Strength	35,446		11,378		12,077	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*						
1. Miasmatic:						
Variola	20	4	7	2	..	..
Varioloides	5	..	1	..	..	..
Varicella	4	..	2	..	..	..
Morbilli	3	2	5	1	2	..
Tonsillitis	590	..	142	..	219	..
Cynanche Trachealis	3	..	..	..	..	..
Influenza	210	..	118	..	78	..
Coryza	..	..	110	..	..	..
Ophthalmia	1,075	..	445	..	528	..
Erysipelas	37	..	25	2	18	1
Furunculus	335	..	111	..	69	..
Anthrax	6	..	4	..	2	..
Dysenteria Acuta	1,347	61	916	34	283	5
„ Chronica			326	12		4
Diarrhœa	3,045	22	1,205	7	1,126	5
Cholera Simplex	6	..	3	..	..	..
„ Spasmodica	71	46	38	28	11	8
Febris Intermittens	11,850	30	1,424	9	3,667	2
„ Remittens	1,014	38	167	2	434	7
„ Typhoides	14	9	9	5	1	1
„ Typhus	1	..	..	..	..	..
„ Continua	3,308	36	1,157	8	1,098	15
Rheumatismus Acutus	2,169	2	272	1	604	2
„ Chronica			368	1		
Parotitis	13	..	4	..	8	..
Vaccinia	2	..	4	..	..	..
Diphtheria	..	..	1	..	..	..
2. Enthetic:						
Syphilis Primaria	2,326	1	918	..	803	..
„ Secundaria	877	12	458	..	430	..
Iritis Syphilitica	34	..	12	..	16	..
Bubo	838	..	461	..	246	..
Gonorrhœa	2,858	..	724	..	839	..
Phymosis, &c.	35	..	17	..	12	..
Orchitis (Gonorrhœal)	206	..	54	..	59	..
Strictura Urethræ	134	1	43	1	35	1
Verrucæ	23	..	7	..	17	..
Ulcus Penis	..	..	34	..	34	..
Cachexia Syphiloidea	2	..	1	..	1	1
Rheumatismus Syphiliticus	..	..	..	..	3	..
3. Dietic:						
Scorbutus	51	..	2	..	59	..
Purpura	5	2	2	1	2	..
Ebriositas	517	10	234	1	157	3
Bronchocele	2	..	..	..	..	..

Appendix No. XXVIII—*continued.*

Stations	Bengal.		Madras.		Bombay.	
Average Strength	35,446		11,378		12,077	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
4. Parasitic:						
Aphthæ	1	..	..	..	..	..
Porrigo	6	..	7	..	3	..
Scabies	77	..	33	..	18	..
Tænia Solium	293	..	23	..	94	..
Dracunculus	3	..	61	..	17	..
Ascaris Lumbricoides	5	..	2	..	..	..
Vermes	20	..	15	..	4	..
II. *Constitutional Diseases.*						
1. Diathetic:						
Podagra	6	..	1	..	4	..
Lumbago	128	..	37	..	46	..
Ischias	11	..	..	..	6	..
Anæmia	235	5	30	..	62	..
Anasarca	14	2	17	3	5	..
Tumores	23	1	5	1	6	..
Lupus	3	..	..	..	1	..
Carcinoma	3	1	4	1	..	..
Scirrhoma	1	1	..	..	..	..
2. Tubercular:						
Scrofula	65	1	42	1	16	..
Phthisis Pulmonalis	264	52	142	18	104	22
Hæmoptysis	64	6	24	1	12	..
Tuberculosis	1	2	..	..	..	..
III. *Local Diseases.*						
1. Nervous System:						
Encephalitis	4	2	2	1	..	..
Meningitis	2	1	1	..	3	1
Myelitis	1	1	..	..	..	..
Apoplexia	12	10	6	4	3	6
Paralysis	57	4	26	1	18	1
Mollities Cerebri	..	..	..	1	..	..
Delirium Tremens	144	12	39	2	32	1
Mania	44	1	11	1	4	..
Amentia	53	3	23	..	13	..
Epilepsia	138	2	30	1	38	2
Hysteria	2	..	2	..	1	..
Odontalgia	3	..	2	..	5	..
Chorea	2	..	..	..	1	..
Tetanus	2	2	1	1	..	..
Amaurosis	1	..	5	..	..	..
Convulsio	9	..	7	..	..	..
Cephalæa	353	..	153	..	116	..
Vertigo	..	..	1	..	..	..
Neuralgia	184	..	30	..	24	..
Dysecœa	36	..	13	..	7	..
Otitis	214	..	51	..	98	..
Polypus Nasi	..	..	..	..	1	..
Hemeralopia	..	..	9	..	1	..
Iritis	..	..	1	..	1	..
Choroiditis	1	..	..	..	..	..
Nyctalopia	4	..	..	..	1	..
Cæcitas	1	..	1	..	16	..
Entropium	..	..	..	..	1	..

Appendix No. XXVIII—*continued.*

Stations	Bengal.		Madras.		Bombay.	
Average Strength	35,446		11,378		12,077	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Sclerotitis	..	..	..	..	1	..
Fistula Lachrymalis	..	..	1	..	1	..
Myopia	1	..	1	..	..	..
Aphonia	3	..	2	..	..	..
Rabies	2	2	..	..	..	..
Polypus Auris	1	..	..	..	..	..
2. Circulatory System:						
Carditis	10	2	127	3	3	..
Pericarditis	11	3	3	1	3	..
Hypertrophia Cordis	87	3	20	1	17	1
Atrophia „	..	2	2	..	1	..
Degeneratio „	3	5	2	..	..	..
Morbus Valv: „	151	17	87	8	31	2
Aneurisma Aortæ	23	10	9	8	4	3
Aneurisma	5	3	11	2	..	..
Atheroma	..	2	..	..	..	..
Varix	27	..	11	..	15	..
Palpitatio	39	..	37	..	40	..
Syncope	16	..	..	..	1	..
Phlebitis	..	..	2	..	1	..
Angina Pectoris	10	..	3	..	4	..
Angioleucitis	..	..	..	..	1	..
3. Respiratory System:						
Laryngitis	14	3	5	1	4	..
Bronchitis Acuta	1,694	13	385	2	498	2
„ Chronica		2	186	..		3
Pleuritis	150	3	33	..	27	..
Pleurodynia	62	..	..	..	9	..
Hydrothorax	1	1	..	..	..	..
Empyema	1	1	..	..	..	..
Pneumonia	105	13	14	1	18	3
Apoplexia Pulmonalis	2	4	..	1	2	..
Asthma	19	..	17	..	4	..
Emphysema	3	..	2	..	1	..
Epistaxis	31	..	1	..	3	..
4. Digestive System:						
Pharyngitis	7	..	3	..	4	..
Glossitis	2	..	..	..	2	..
Stomatitis	5	..	1	..	..	..
Gastritis	28	5	9	1	4	..
Enteritis	10	4	4	1	6	1
Colonitis	..	..	1	1	..	..
Peritonitis	11	5	..	..	3	2
Obstipatio	121	1	55	..	26	..
Dyspepsia	1,319	1	662	..	372	..
Colica	450	1	77	..	108	..
Ileus	1	..	..	..	..	..
Hæmatemesis	12	..	4	1	4	1
Hernia	37	1	14	..	13	..
Hæmorrhois	360	..	132	..	101	..
Prolapsus Ani	3	..	3	..	2	..
Strictura Recti	..	..	..	..	1	..
Fistula in Ano	34	1	7	..	9	..
Splenitis	218	1	20	..	40	..

Appendix No. XXVIII—*continued.*

Stations	Bengal.		Madras.		Bombay.	
Average Strength	35,446		11,378		12,077	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Hepatitis Acuta	2,005	55	439	22	475	11
„ Chronica		34	455	16		8
Icterus	148	2	32	..	68	..
Cirrhosis	..	1	..	..	..	..
Ascites	8	1	6	2	..	..
Melæna	2	..	..	..	..	..
5. Urinary System:						
Nephritis	27	..	15	1	9	1
Nephria	21	7	..	..	4	1
Ischuria	9	..	..	..	1	..
Hæmaturia	11	1	2	..	2	..
Lithiasis	4	..	1	..	..	..
Cystitis	10	1	3	..	5	..
Fistula in Perineo	8	..	3	..	4	..
Enuresis	12	..	16	..	8	..
Diuresis	5	..	2	..	2	..
Dysuria	..	..	..	..	1	..
Morbus Prostaticus	1	..	..	..	..	..
6. Reproductive System:						
Varicocele	5	..	6	..	2	..
Hydrocele	32	..	14	..	8	..
Hæmatocele	..	..	..	..	1	..
Orchitis (not Gonorrhœal)	570	..	218	..	174	..
Sarcocele	..	..	1	..	2	..
Spermatorrhœa	1	..	..	..	..	..
7. Locomotive System:						
Arthritis	36	..	2	..	8	..
Synovitis	52	..	32	..	21	..
Hydrarthrus	..	..	1	..	..	..
Contractura	3	..	11	..	1	..
Periostitis	80	..	14	..	21	..
Exostosis	10	..	2	..	1	..
Caries	11	..	1	1	3	1
Necrosis	11	..	3	..	1	..
Atrophia Musculorum	2	..	..	..	..	..
8. Integumentary System:						
Urticaria	13	..	5	..	4	..
Eczema	116	..	41	..	20	..
Herpes	112	..	55	..	15	..
Impetigo	8	..	7	..	5	..
Psoriasis	73	..	12	..	11	..
Lichen	6	..	1	..	1	..
Prurigo	3	..	1	..	1	..
Ecthyma	3	..	3	..	2	..
Acne	16	..	1	..	3	..
Hordeolum	..	..	..	..	1	..
Lepra	7	..	2	..	..	..
Roseola	..	..	3	..	..	..
Rupia	5	..	2	..	..	..
Pityriasis	2	..	3	..	..	..
Mentagra	5	..	1	..	..	..
Pemphigus	2	..	4	..	..	..
Phlegmon	1,188	..	605	..	390	..

Appendix No. XXVIII—*continued.*

Stations	Bengal.		Madras.		Bombay.	
Average Strength	35,446		11,378		12,077	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Abscessus	556	..	146	1	163	..
Paronychia	107	..	17	..	42	..
Ulcus	1,260	..	552	..	407	..
IV. *Developmental Diseases.*						
4. Diseases of Nutrition:						
Atrophia	119	10	251	3	129	..
V. *Violent Deaths or Diseases.*						
1. Accidental:						
Ambustio	54	..	12	..	28	..
Explosio	24	2	2	..	..	..
Insolatio	102	50	41	13	19	9
Submersio	..	21	2	2	..	2
Asphyxia	1	2	..	..	..	1
Fractura	147	5	46	2	51	2
Privatio	..	..	..	..	1	..
Ruptura Hepatis	..	..	..	..	..	1
Amputatio	5	1	..	..	1	..
Resectio	1	..	..	..	..	..
Contusio	1,788	3	715	..	711	..
Commotio	7	2	5	..	4	..
Vulnus Sclopetarium	23	..	5	..	2	..
„ Incisum	355	1	135	..	125	1
Luxatura	29	..	16	..	10	..
Subluxatio	771	1	227	1	204	..
Vesiculæ Pedis	102	..	47	..	25	..
Venenatio	5	..	2	..	1	..
Morsus Scorpionis	2	..	3	..	1	..
„ Felis	..	..	..	..	1	..
„ Apis	..	..	1	..	..	..
„ Canis	19	..	7	..	..	..
„ Serpentis	4	..	1	..	..	..
„ Hominis	2	..	..	..	..	..
„ Equi	1	..	..	..	..	..
3. Homicidal:						
Vulnus Sclopetarium	2	1	..	..	..	1
„ Incisum	1	..	..	..	..	..
Fractura	..	1	..	..	..	..
4. Suicidal:						
Suspendium	..	1	..	2	..	1
Submersio	..	2	..	2	..	1
Venenatio	..	..	..	..	..	1
Vulnus Sclopetarium	..	8	..	..	..	5
„ Incisum	2	4	..	1	..	..
Concussio	1	2	..	..	..	..
5. Judicial:						
Suspendium	..	1	..	..	..	1
6. Punitus	60	..	37	..	28	..
No appreciable disease	33	..	18	..	..	..
Total	51,141	714	16,959	253	16,259	154

Appendix No. XXVIII—*continued.*

CAUSES of the Deaths of the Invalids.

		Bengal.	Madras.	Bombay.
I.—1.	Dysenteria	17	3	5
	Diarrhœa	8	..	..
	Cholera	4	..	..
	Febris Remittens ..	1	..	..
	Rheumatismus	..	..	1
2.	Syphilis Secundaria ..	7	2	1
	Strictura Urethræ ..	1	..	..
II.—2.	Phthisis Pulmonalis ..	34	11	14
	Hæmoptysis	1	..	..
III.—1.	Paralysis	3	1	1
	Epilepsia	1	..	..
	Delirium Tremens ..	1	..	..
	Morbus Cerebri	..	1	..
2.	Morbus Valv: Cordis ..	6	1	2
	Hypertrophia „ ..	1	..	..
	Aneurisma	3	..	..
3.	Bronchitis	1	..	..
	Pneumonia	2	..	..
	Empyema	1	..	..
4.	Pharyngitis	1	..	..
	Hepatitis	7	2	2
	Splenitis	1	..	..
	Peritonitis	1	..	..
5.	Nephritis	1	..	..
	Nephria	1	..	1
IV.—4.	Atrophia	..	..	1
V.—1.	Submersio	2	..	..
	Insolatio	1	..	..
	Ruptura Vesicæ ..	1	..	..
	Total	108	21	28

APPENDIX No. XXIX.

ABSTRACT, showing the Number of Men sent Home as Invalids from Bengal, Madras, and Bombay, during the Year 1866. Also the Number of Invalids from India finally Discharged the Service at the Invalid Depôt in England during the Year.

Stations	Bengal.	Madras.	Bombay.	India.
Strength	35,446	11,378	12,077	58,901
Causes of Disability.	Sent home.	Sent home.	Sent home.	Discharged at Netley.
I. *Zymotic Diseases.*				
1. Miasmatic Diseases:				
Tonsillitis	2	..	..	..
Ophthalmia	15	3	23	43
Erysipelas	1	..	..	..
Dysenteria	59	60	6	30
Diarrhœa	24	11	6	7
Febris Intermittens	60	44	18	8
„ Remittens	12	..	..	5
„ Continua	7	..	..	..
Rheumatismus Acuta	..	7	..	..
„ Chronica	152	40	86	78
2. Enthetic Diseases:				
Syphilis Primaria	9	61	10	..
„ Secundaria	99	..	31	94
Iritis Syphilitica	..	..	..	2
Bubo	1	2	..	1
Strictura Urethræ	11	2	3	9
Verrucæ	1	..	..	..
Cachexia Syphiloidea	..	..	1	..
Morbus Testis	..	..	..	1
3. Dietic Diseases:				
Scorbutus	1	..	1	1
4. Parasitic Diseases:				
Tænia Solium	1	..	1	..
II. *Constitutional Diseases.*				
1. Diathetic Diseases:				
Lumbago	3	..	1	..
Anæmia	74	2	20	26
Tumores	..	..	1	1
Lupus	..	..	1	..
Scirrhoma	1	..	..	..
Carcinoma	..	1	..	..
2. Tubercular Diseases:				
Scrofula	13	8	4	23
Phthisis Pulmonalis	123	39	77	116
Hæmoptysis	2	1	2	2
Morbus Coxarius	..	..	..	1
Tuberculosis	1	..	..	..
III. *Local Diseases.*				
1. Nervous System:				
Meningitis	1	..	..	1
Apoplexia	1	..	..	..

Appendix No. XXIX—*continued.*

Station	Bengal.	Madras.	Bombay.	India.
Strength	35,446	11,378	12,077	58,901
Causes of Disability.	Sent home.	Sent home.	Sent home.	Discharged at Netley.
Paralysis	21	9	9	36
Mania	20	..	4	..
Amentia	14	6	12	..
Epilepsia	41	6	7	28
Hysteria	1	..	..	..
Chorea	1	..	..	..
Convulsio	1	..	..	..
Cephalæa	21	6	7	18
Neuralgia	2	..	1	1
Dysecœa	10	2	3	23
Otitis	5	..	..	2
Cæcitas	4	..	..	15
Myopia	1	..	..	6
Amblyopia	..	..	2	3
Hypermetropi	..	..	1	..
Amaurosis	4	2	..	4
Hemeralopia	..	1	..	..
Fistula Lachrymalis	..	1	..	..
Polypus Nasi	..	1	..	..
Psellismus	1	..	..	..
2. Circulatory System:				
Carditis	..	26	..	7
Pericarditis	1	1	1	3
Hypertrophia Cordis	51	12	8	36
Morbus Valv: Cordis	49	22	20	79
Palpitatio Cordis	3	2	9	2
Degeneratio Cordis	1	..	1	..
Angina Pectoris	..	1	..	3
Aneurisma Aortæ	4	..	2	..
,,	2	3	..	7
Varix	23	7	6	19
Syncope	..	..	..	1
3. Respiratory System:				
Laryngitis	4	..	..	1
Bronchitis	42	31	16	32
Pleuritis	11	..	..	1
Pneumonia	3	..	..	..
Asthma	8	..	1	3
Epistaxis	..	1	..	..
Emphysema	2	..	..	2
4. Digestive System:				
Pharyngitis	1	..	1	..
Gastritis	2	..	..	..
Dyspepsia	16	7	7	15
Hernia	15	6	5	22
Hæmorrhois	4	1	1	4
Prolapsus Ani	..	1	..	..
Fistula in Ano	3	..	2	4
Splenitis	14	2	4	1
Hepatitis	259	104	55	126
Icterus	1	..	..	..
Ascites	1	..	..	1

Appendix No. XXIX—*continued.*

Stations	Bengal.	Madras.	Bombay.	India.
Strength	35,446	11,378	12,077	58,901
Causes of Disability.	Sent home.	Sent home.	Sent home.	Discharged at Netley.
5. Urinary System:				
Nephritis	1	2	1	2
Nephria	5	..	1	3
Hæmaturia	2	..	..	..
Lithiasis	..	..	..	1
Cystitis	1	..	1	..
Fistula in Perineo	1	..	1	..
Morbus Prostaticus	..	..	..	1
6. Reproductive System:				
Varicocele	1	3	1	2
Hydrocele	2	2	..	1
Orchitis (not Gonorrhœal)	1	5	1	16
7. Locomotive System:				
Arthritis	9	..	..	7
Synovitis	4	..	5	4
Contractura	..	1	..	4
Periostitis	4	3	1	4
Exostosis	2	..	..	3
Caries	4	..	2	4
Necrosis	2	..	1	4
Atrophia Musculorum	2	..	1	..
Curvatura Spinalis	..	..	..	4
8. Integumentary System:				
Eczema	..	1	..	..
Psoriasis	..	..	..	1
Phlegmon	1	..	..	..
Abscessus	6	..	..	3
Ulcus	14	4	6	19
IV. *Developmental Diseases.*				
4. Diseases of Nutrition:				
Worn out	..	6	..	..
Atrophia	207	60	47	219
Senectus	30	1	..	..
V. *Violent Deaths or Diseases.*				
1. Accidental:				
Explosio	..	1	..	..
Insolatio	9	..	..	3
Fractura	13	9	5	16
Amputatio	1	..	..	2
Contusio	4	2	2	4
Commotio	..	..	1	2
Vulnus Sclopetarium	2	1	..	5
„ Incisum	..	1	..	..
Luxatura	1	..	..	5
Subluxatio	3	1	1	7
Disease not specified	1	..	..	..
Total	1,674	645	555	1,295

APPENDIX No. XXX.

ABSTRACT, showing the Ages of the Troops serving in the Bengal Presidency, and the Deaths at each Age, during the Year 1866.

	Under 20.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.
2nd Dragoon Guards	30	..	140	..	220	4	50	5	9	3	7	..	456	12
7th „ .. „	..	..	73	1	211	2	120	5	74	2	8	1	486	11
5th Lancers	10	..	81	..	307	7	68	..	20	2	2	..	488	9
7th Hussars	..	..	120	..	307	4	114	4	30	1	3	..	574	9
19th „	5	..	45	..	363	3	28	..	17	1	14	..	472	4
20th „	..	..	5	1	151	3	263	4	85	2	14	..	518	10
21st „	..	..	143	..	286	6	22	2	11	..	2	1	464	9
A Brigade, Royal Horse Artillery.	12	..	252	7	303	9	131	3	12	..	4	..	714	19
C „ „ „	4	..	62	2	132	3	57	2	5	..	3	..	263	7
11th „ Royal Artillery ..	4	..	90	1	286	3	439	11	58	1	8	..	885	16
16th „ „ ..	25	..	438	14	321	19	155	9	61	6	2	..	1,002	48
19th „ „ ..	5	..	385	2	319	4	169	2	87	2	20	2	985	12
22nd „ „ ..	7	..	225	..	279	7	128	1	32	1	11	..	682	9
24th „ „ ..	5	..	123	4	140	1	105	1	51	1	16	2	440	9
25th „ „ ..	9	..	159	5	126	6	70	3	27	1	7	..	398	15
1st Battalion, 7th Foot	19	..	79	1	433	17	203	1	81	3	13	1	828	23
1st „ 11th „	146	1	434	5	220	9	67	4	14	2	..	1	881	22
2nd „ 12th „	35	1	365	3	279	2	86	3	50	2	12	1	827	12
1st „ 19th Foot	66	..	307	5	387	7	119	5	69	4	2	1	950	22
1st „ 23rd „	4	1	298	2	492	11	95	14	28	5	..	1	917	34
27th Foot	52	..	213	4	397	10	173	8	80	1	4	3	919	26
34th „	61	..	213	..	346	9	127	7	46	2	5	1	798	19
35th „	58	..	263	..	342	1	107	3	70	1	2	..	842	5
36th „	79	1	326	3	204	1	75	2	49	2	..	1	733	10

Appendix No. XXX—*continued.*

ABSTRACT, showing the Ages of the Troops serving in the Bengal Presidency, &c.—*continued.*

	Under 20.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.
38th Foot	24	..	117	2	361	4	136	2	53	..	6	..	697	8
41st „	175	1	248	12	210	4	82	4	29	2	54	..	798	23
42nd „	11	..	192	4	408	5	128	2	35	..	3	..	777	11
46th „	18	..	361	1	345	4	187	6	67	..	7	..	985	11
51st „	4	..	316	..	359	4	121	..	30	1	7	..	837	5
55th „	17	..	460	3	285	13	112	11	33	5	2	2	909	34
58th „	29	..	372	1	261	10	109	5	15	5	..	..	786	21
77th „	27	..	284	..	362	5	105	1	35	1	5	..	818	7
79th „	25	1	389	3	323	4	110	3	14	1	..	..	861	12
82nd „	38	..	95	3	487	9	201	6	82	3	12	1	915	22
88th „	25	..	125	1	595	14	73	5	59	7	6	..	883	27
91st „	46	..	236	5	379	11	170	12	70	6	13	2	914	36
93rd „	6	..	159	4	388	8	194	1	60	..	1	..	808	13
94th „	22	..	198	1	433	10	129	2	52	..	2	..	836	13
97th „	49	..	423	2	244	7	120	2	61	2	..	..	897	13
98th „	13	..	107	..	478	9	170	4	92	4	17	..	877	17
101st „	7	..	379	1	408	18	64	4	46	1	2	1	906	25
104th „	11	..	86	3	527	6	127	1	25	8	12	..	788	18
105th „	90	..	177	4	219	10	266	4	50	2	43	..	845	20
107th „	15	..	239	4	406	11	169	5	67	5	6	1	902	26
2nd Battalion, Rifle Brigade ..	39	..	219	3	481	6	155	5	34	..	2	..	930	14
3rd „ „ „ ..	2	..	86	..	586	1	146	1	28	..	1	..	849	2
Total	1,329	6	10,107	117	15,396	321	6,045	185	2,103	98	360	23	35,340	750

Appendix No. XXX—*continued.*

ABSTRACT, showing the Ages of the Troops serving in the Madras Command, and the Deaths at each Age, during the Year 1866.

	Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.
16th Lancers	63	..	146	2	250	6	73	2	18	..	5	1	555	11
18th Hussars	32	..	173	2	244	19	40	4	12	1	5	1	506	27
D Brigade, Royal Horse Artillery.	3	..	174	2	198	3	98	5	81	3	12	..	566	13
14th „ Royal Artillery ..	8	..	42	1	189	3	150	4	44	2	5	..	433	10
20th „ „ ..	30	..	218	4	287	6	129	3	66	4	16	3	746	20
23rd „ „ ..	54	..	244	1	217	2	165	6	45	3	4	1	729	13
1st Battalion, 1st Foot	39	..	195	1	288	11	199	5	40	3	8	..	769	20
2nd „ 10th „	137	1	333	2	354	5	112	5	22	1	4	1	962	15
2nd „ 19th „	7	..	208	4	458	10	114	2	31	3	5	..	823	19
2nd „ 21st „	45	..	525	5	173	16	83	2	24	2	6	1	856	26
2nd „ 24th „	71	1	278	4	352	11	76	1	16	2	1	..	794	19
3rd „ 60th „	62	..	253	2	207	5	24	6	..	3	2	..	548	16
76th Foot	19	..	373	1	224	4	86	2	89	3	4	..	795	10
102nd „	84	..	418	2	265	4	124	4	85	3	16	2	992	15
108th „	204	..	300	12	193	9	154	3	48	3	8	1	907	28
Total ..	853	2	3,880	45	3,899	114	1,627	54	621	36	101	11	10,981	262

APPENDIX No. XXX—*continued.*

ABSTRACT, showing the Ages of the Troops serving in the Bombay Command, and the Deaths at each Age, during the Year 1866.

	Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.
3rd Dragoon Guards	13	..	49	1	219	5	159	3	26	..	9	..	475	9
6th Dragoons	1	..	15	..	260	1	162	..	24	..	10	..	472	1
E Brigade, Royal Horse Artillery .	..	..	155	..	152	1	98	2	84	1	2	..	491	4
14th „ Royal Artillery ..	3	..	104	..	286	3	162	5	36	3	3	..	594	11
18th „ „	4	..	249	1	307	6	203	4	102	3	21	..	886	14
21st „ „	3	..	99	..	137	4	104	1	77	..	25	..	445	5
1st Battalion, 4th Foot	37	1	190	3	357	3	194	4	78	1	5	3	861	15
26th Foot	192	..	309	6	174	2	92	..	54	2	19	..	840	10
33rd „	21	..	66	2	453	6	239	1	120	1	16	1	915	11
45th „	204	1	345	8	264	2	60	3	43	1	..	..	916	15
49th „	151	..	209	3	241	5	146	4	73	1	10	..	830	13
95th „	28	..	143	..	449	2	159	1	82	2	6	..	867	5
96th „	..	..	250	..	187	..	126	..	19	..	..	..	582	..
103rd „	10	..	251	1	299	8	163	3	175	4	49	..	947	16
106th „	75	..	245	2	368	2	122	1	103	3	24	..	937	8
109th „	35	..	236	6	287	4	190	4	61	4	31	5	840	23
Total	777	2	2,915	33	4,440	54	2,379	36	1,157	26	230	9	11,898	160

APPENDIX No. XXXI.

ABSTRACT, showing the Cases of Sickness and Deaths among Troops on board Ship, proceeding on Foreign Service.

Stations	To the Cape, Ceylon, India, and China.		To Mediterranean.		To British America.	
Number of Men Embarked ..	9,120		3,563		3,510	
Average Annual Strength ..	2,684		130		165	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*						
1. Miasmatic:						
Morbilli	6	..	..	..	..	..
Tonsillitis	31	..	11	..	2	..
Influenza	8	..	..	..	..	..
Ophthalmia	31	..	2	..	1	..
Erysipelas	1	..	..	..	..	..
Furunculus	25	..	..	..	1	..
Dysenteria Acuta	10	..	..	..	..	..
„ Chronica	1	..	..	..	..	..
Diarrhœa	129	..	1	..	4	..
Cholera Spasmodica	34	9	..	..	..	..
Febris Intermittens	9	..	2	..	..	..
„ Remittens	3	..	..	..	..	..
„ Typhoides	10	6	..	..	..	..
„ Continua	30	3	1	..	1	..
Rheumatismus Acutus	33	..	4	..	1	..
„ Chronicus ..	14	..	1	..	..	..
Parotitis	1	..	..	..	..	..
2. Enthetic:						
Syphilis Primaria	102	..	24	..	14	..
„ Secundaria	32	1	2	..	3	..
Iritis Syphilitica	2	..	..	..	1	..
Bubo	30	..	9	..	6	..
Gonorrhœa	81	..	23	..	19	..
Phymosis, &c.	7	..	1	..	..	..
Orchitis (Gonorrhœal)	13	..	3	..	2	..
Strictura Urethræ	2	..	1	..	..	..
Verrucæ	1	..	..	..	..	..
3. Dietic:						
Scorbutus	23	..	..	..	..	..
Purpura	1	..	..	..	..	..
Ebriositas	..	..	1	..	..	..
4. Parasitic:						
Porrigo	2	..	..	..	..	..
Scabies	50	..	..	..	..	..
Ascaris Lumbricoides	3	..	..	..	..	..
II. *Constitutional Diseases.*						
1. Diathetic:						
Podragra	1	..	..	..	..	..
Anæmia	3	..	..	..	..	..
Anasarca	1	..	..	..	..	..
Gangræna	1	..	..	..	..	..

Appendix No. XXXI—*continued.*

Stations	To the Cape, Ceylon, India, and China.		To Mediterranean.		To British America.	
Number of Men Embarked	9,120		3,563		3,510	
Average Annual Strength	2,684		130		165	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
2. Tubercular:						
Scrofula	7	..	..	..	..	..
Phthisis Pulmonalis	5	..	2	..	..	..
Hæmoptysis	4	..	1	..	..	..
III. *Local Diseases.*						
1. Nervous System:						
Encephalitis	1	..	..	..	..	..
Meningitis	1	1	..	..	..	..
Paralysis	2	..	..	..	..	..
Morbus Cerebri	1	..	..	..	..	..
Delirium Tremens	1	..	1	..	..	..
Mania	2	..	..	..	..	..
Epilepsia	5	..	..	..	..	..
Cephalæa	9	..	..	..	..	..
Vertigo	..	..	1	..	..	..
Otitis	7	..	..	..	..	..
Sclerotitis	2	..	..	..	..	..
Amaurosis	1	..	..	..	..	..
Ptosis	1	..	..	..	..	..
2. Circulatory System:						
Carditis	1	..	..	..	..	..
Pericarditis	1	..	..	..	..	..
Morbus Valv. Cordis	1	1	..	..	..	..
Angina Pectoris	1	..	..	..	..	..
Morbus Cordis	1	..	..	..	..	..
Palpitatio „	1	..	..	..	..	..
Aneurisma	1	..	..	..	..	..
3. Respiratory System:						
Bronchitis Acuta	48	..	4	..	2	..
„ Chronica	5	..	..	..	..	..
Pleuritis	34	..	..	..	1	..
Pneumonia	10	..	..	..	4	1
Pleurodynia	2	..	..	..	..	..
4. Digestive System:						
Stomatitis	1	..	..	..	..	..
Gastritis	10	1	..	..	1	..
Enteritis	1	..	..	..	..	..
Obstipatio	2	..	..	..	..	..
Dyspepsia	25	..	1	..	8	..
Colica	8	..	3	..	..	..
Hernia	2	..	1	..	..	..
Hæmorrhois	4	..	..	..	..	..
Fistula in ano	1	..	..	..	..	..
Hepatitis Acuta	9	..	..	..	..	..
„ Chronica	5	..	..	..	..	..
Icterus	8	..	..	..	2	..

Appendix No. XXXI—*continued.*

Stations	To the Cape, Ceylon, India, and China.		To Mediterranean.		To British America.	
Number of Men Embarked ..	9,120		3,563		3,510	
Average Annual Strength ..	2,684		130		165	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
5. Urinary System:						
Nephritis	3	..	..	..	..	..
Nephria	1	..	..	..	..	..
Cystitis	..	..	..	..	1	..
Dysuria	1	..	..	..	..	..
6. Reproductive System:						
Hydrocele	2	..	..	..	..	..
Orchitis (not Gonorrhœal) ..	21	..	2	..	..	..
7. Locomotive System:						
Synovitis	8	..	..	..	..	..
Periostitis	3	..	..	..	..	..
8. Integumentary System:						
Eczema	3	..	..	..	..	..
Psoriasis	2	..	1	..	..	..
Ecthyma	1	..	..	..	..	..
Phlegmon	40	..	11	..	9	..
Abscessus	31	..	..	..	1	..
Paronychia	16	..	1	..	..	..
Ulcus	54	..	2	..	7	..
IV. *Developmental Diseases.*						
4. Diseases of Nutrition:						
Atrophia	2	..	..	..	..	..
V. *Violent Deaths or Diseases.*						
1. Accidental:						
Ambustio	13	..	1	..	3	..
Explosio	1	..	..	..	..	..
Insolatio	2	1	..	..	..	..
Submersio	..	1	..	..	..	..
Fractura	12	1	..	..	2	..
Contusio	34	..	6	..	5	..
Vulnus Incisum	13	..	3	..	..	..
Subluxatio	9	..	3	..	3	..
Vesiculæ Pedis	1	..	1	..	..	..
6. Punitus	1	..	1	..	..	..
Total	1,236	25	132	..	104	1

APPENDIX No. XXXII.

ABSTRACT, showing the Cases of Sickness and Deaths among Troops on board Ship returning from Foreign Service.

Stations	Mauritius, India, China, and Cape to England.		Australasia to England.		Mediterranean, West Indies, Nova Scotia, and Bermuda to England.	
Number of Men embarked	4,042		3,037		1,752	
Average Annual Strength	1,030		786		101	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. Zymotic Diseases.						
1. Miasmatic:						
Tonsillitis	3	..	4	..	..	..
Influenza	6	..	..	..	2	..
Ophthalmia	44	..	16	..	2	..
Erysipelas	..	..	2	..	..	..
Furunculus	4	..	6	..	1	..
Anthrax	1	..	..	..	..	..
Dysenteria Acuta	27	4	..	..	1	..
„ Chronica	24	2	4	1	..	..
Diarrhœa	97	1	18	1	4	..
Cholera	9	5	..	..	..	..
Febris Intermittens	54	1	3	..	10	..
„ Continua	62	2	6	..	2	..
Rheumatismus Acutus	13	..	2	..	2	..
„ Chronicus	29	..	5	..	4	..
Parotitis	1	..	1	..	..	..
2. Enthetic:						
Syphilis Primaria	43	..	1	..	5	..
„ Secundaria	24	..	5	..	3	..
Iritis Syphilitica	6	..	..	..	..	..
Bubo	21	..	..	..	1	..
Gonorrhœa	29	..	8	..	1	..
Phymosis, &c.	2	..	..	..	..	..
Orchitis (Gonorrhœal)	2	..	3	..	..	..
Strictura Urethræ	3	1	2	..	..	..
Ulcus Penis	4	..	..	..	..	..
3. Dietic:						
Scorbutus	4	..	..	..	..	..
Ebriositas	2	..	..	..	..	..
4. Parasitic:						
Porrigo	1	..	..	..	..	..
Scabies	2	..	3	..	..	..
Dracunculus	2	..	..	..	..	..
II. Constitutional Diseases.						
1. Diathetic:						
Lumbago	1	..	..	..	..	..
Ischias	1	..	..	..	..	..
Lupus	1	..	..	..	..	..
Anasarca	3	..	1	..	..	..

Appendix No. XXXII—*continued.*

Stations	Mauritius, India, China, and Cape to England.		Australasia to England.		Mediterranean, West Indies, Nova Scotia, and Bermuda to England.	
Number of Men embarked	4,042		3,037		1,752	
Average Annual Strength	1,030		786		101	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
2. Tubercular:						
Phthisis Pulmonalis	11	2	5	..	..	..
Hæmoptysis	5	1	1	..	..	..
III. *Local Diseases.*						
1. Nervous System:						
Cephalitis	..	..	..	..	1	..
Paralysis	3	..	..	..	..	..
Delirium Tremens	..	..	..	..	2	..
Epilepsia	5	1	1	..	..	..
Cephalæa	4	..	1	..	1	..
Dysecœa	1	..	..	..	..	..
Otitis	..	..	2	..	1	..
Cæcitas	1	..	.	..	..	..
Ozœna	1	..	..	..	..	..
Sea Sickness	..	..	1	..	..	..
2. Circulatory System:						
Pericarditis	..	..	2	1	..	..
Hypertrophia Cordis	..	..	1	..	..	..
Morbus Valv. Cordis	1	1	1	..	..	..
Morbus Cordis	1	1	..	..	..	..
Aneurisma	..	1	1	..	..	..
Phlebitis	..	..	1	..	..	..
3. Respiratory System:						
Bronchitis Acuta	46	..	18	..	5	..
„ Chronica	10	..	13	1	..	..
Pleuritis	2	..	3	..	..	..
Pneumonia	1	..	3	..	..	..
Asthma	2	..	1	..	..	..
4. Digestive System:						
Obstipatio	5	..	2	..	..	..
Dyspepsia	8	..	4	..	..	..
Colica	2	..	3	..	..	..
Hernia	..	..	..	..	1	..
Prolapsus Ani	1	..	..	..	..	..
Hæmorrhois	2	..	3	..	..	..
Splenitis	3	..	..	..	..	..
Hepatitis Acuta	21	5	3	..	..	..
„ Chronica	17	4	3	..	..	..
Icterus	5	..	..	..	..	..
Ascites	4	2	..	..	..	..

Appendix No. XXXII—*continued.*

Stations	Mauritius, West Indies, and Cape to England.		Australasia to England.		Mediterranean, West Indies, Nova Scotia, and Bermuda to England.	
Number of Men embarked ..	4,042		3,037		1,752	
Average Annual Strength ..	1,030		786		101	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
5. Urinary System:						
Nephria	2	1	..	..	..	..
Enuresis	2	..	..	..	..	..
6. Reproductive System:						
Hydrocele	..	..	..	..	1	..
Orchitis (not Gonorrhœal) ..	13	..	..	..	2	..
7. Locomotive System:						
Arthritis	..	..	1	..	..	..
Synovitis	2	..	..	..	1	..
Contractura	1	..	..	..	..	..
Periostitis	4	..	1	..	..	..
Exostosis	..	..	1	..	..	..
Necrosis	1	..	..	..	..	..
8. Integumentary System:						
Eczema	2	..	1	..	..	..
Herpes	13	..	2	..	..	..
Lichen	1	..	..	..	..	..
Intertrigo	..	..	1	..	..	..
Prurigo	3	..	..	..	..	..
Phlegmon	35	..	13	..	4	..
Abscessus	9	..	2	..	2	..
Paronychia	..	..	4	..	3	..
Ulcus	44	..	13	..	4	..
IV. *Developmental Diseases.*						
4. Diseases of Nutrition:						
Atrophia	1	..	1	..	..	..
V. *Violent Deaths or Diseases.*						
1. Accidental:						
Ambustio	9	..	2	..	..	..
Gelatio	..	..	1	..	..	..
Insolatio	1	..	..	..	..	..
Fractura	2	..	4	..	1	..
Contusio	22	..	12	..	1	..
Commotio	2	..	..	..	..	..
Vulnus Sclopetarium	4	..	1	..	2	..
„ Incisum	6	..	7	..	..	..
Luxatura	1	..	..	..	..	..
Subluxatio	6	..	3	..	2	..
Vesiculæ Pedis	1	..	..	..	1	..
6. Punitus	2	..	1	..	..	..
Total	876	35	234	4	73	..

APPENDIX XXXIII.

ABSTRACT, showing the Cases of Sickness and Deaths among Troops on Board Ship proceeding from one Colony or Station to another.

Stations ..	Between India, China, Japan, Mauritius and Cape of Good Hope.		Between Mediterranean, West Indies, and North America.		Colonial Troops.			
					Ceylon to Hong Kong.		Between West Coast of Africa and West Indies.	
Number of Men embarked	2,898		5,175		361		3,310	
Average Annual Strength ..	149		277		23		4 13	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*								
1. Miasmatic:								
Tonsillitis	1	..	3	..	..	..	20	..
Influenza	..	..	..	..	..	..	1	..
Ophthalmia.. ..	4	..	7	..	6	..	6	..
Erysipelas	..	..	1	1	..	..	..	..
Furunculus	..	..	..	..	..	..	1	..
Dysenteria Acuta ..	2	..	..	..	5	..	9	1
„ Chronica	1	..	..	..	..	..	5	..
Diarrhœa	25	2	1	..	5	..	32	..
Febris Intermittens	13	..	..	..	16	..	28	..
„ Remittens ..	..	..	..	..	..	..	14	3
„ Continua ..	3	..	7	..	..	..	23	..
Rheumatismus Acut.	1	..	3	..	1	..	16	..
„ Chron.	7	..	9	..	..	..	14	..
Parotitis	..	..	..	..	1	..	..	..
2. Enthetic:								
Syphilis Primaria ..	16	..	2	..	..	..	30	..
„ Secundaria	3	..	..	..	..	..	7	..
Bubo	6	..	3	..	..	..	8	..
Gonorrhœa	16	..	3	..	..	..	25	..
Orchitis(Gonorrhœal)	3	..	..	..	..	..	1	..
3. Dietic:								
Ebriositas	2	..	2	..	..	..	7	..
4. Parasitic:								
Porrigo	..	..	1	..	..	..	..	..
Scabies	..	..	..	..	..	..	7	..
Tænia Solium ..	..	..	..	..	2	..	..	..
Dracunculus ..	..	..	..	..	..	..	1	..
II. *Constitutional Diseases.*								
1. Diathetic:								
Anasarca	1	..	..	..	2	..	..	..
2. Tubercular:								
Scrofula	1	..	..	..	..	..	..	..
Phthisis Pulmonalis	2	1	..	..	..	..	2	1
Hæmoptysis ..	..	..	..	..	..	..	2	..

Appendix No. XXXIII—*continued.*

Stations ..	Between India, China, Japan, Mauritius, and Cape of Good Hope.		Between Mediterranean, West Indies, and North America.		Colonial Troops.			
					Ceylon to Hong Kong.		Between West Coast of Africa and West Indies.	
Number of Men embarked	2,898		5,175		361		3,310	
Average Annual Strength ..	149		277		23		413	
Diseases.	**Admitted.**	**Died.**	**Admitted.**	**Died.**	**Admitted.**	**Died.**	**Admitted.**	**Died.**
III. *Local Diseases.*								
1. Nervous System:								
Paralysis	..	..	1	..	..	..	1	1
Delirium Tremens ..	1	1	1	1	..	..	1	..
Mania	1	..	..	..	..	..	..	..
Epilepsia	1	..	..	..	..	..	3	..
Cephalæa	1	..	..	..	..	..	9	..
Neuralgia	..	..	1	..	..	..	..	..
Otitis	1	..	..	..	..	..	2	..
Iritis	..	..	1	..	..	..	..	..
2. Circulatory Syst:								
Hypertrophia Cordis	..	..	..	..	..	..	1	1
3. Respiratory Syst:								
Laryngitis	1	..	..	..	..	..	..	..
Bronchitis Acuta ..	4	..	2	..	4	..	96	..
„ Chronica	1	..	..	..	..	..	4	..
Pneumonia	..	..	..	..	..	..	4	..
Asthma	..	..	..	..	..	..	2	..
4. Digestive Syst:								
Obstipatio	..	..	..	..	..	..	26	..
Dyspepsia	1	..	2	..	..	..	7	..
Colica	..	..	4	..	..	..	..	..
Hernia	..	..	..	..	..	..	3	..
Hepatitis Acuta ..	2	..	..	..	..	..	..	..
6. Reproductive Syst:								
Orchitis (not Gonorr.)	1	..	3	..	..	..	10	..
7. Locomotive Syst:								
Arthritis	1	..	..	..	..	..	..	..
Synovitis	1	..	..	..	..	..	..	..
8. Integument: Syst:								
Eczema	1	..	1	..	..	..	1	..
Herpes	3	..	..	..	..	..	1	..
Psoriasis	..	..	..	..	..	..	6	..
Phlegmon	6	..	10	..	3	..	5	..
Abscessus	..	..	..	..	..	..	19	..
Paronychia	..	..	..	..	..	..	1	..
Ulcus	14	..	3	..	3	..	30	..
IV. *Developmental Diseases.*								
Atrophia	..	..	4	..	..	..	..	..

Appendix No. XXXIII—*continued.*

Stations ..	Between India China, Japan, Mauritius, and Cape of Good Hope.		Between Mediterranean West Indies, and North America.		Colonial Troops.			
					Ceylon to Hong Kong.		Between West Coast of Africa and West Indies.	
Number of Men embarked	2,898		5,175		361		3,310	
Average Annual Strength ..	149		277		23		413	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
V. *Violent Deaths or Diseases.*								
1. Accidental:								
Ambustio	2	..	1	..	..	..	1	..
Fractura	..	..	..	..	..	..	1	..
Contusio	4	..	10	..	..	..	12	..
Vulnus Incisum ..	2	..	1	..	1	..	10	..
Luxatura	..	..	1	..	1	..	1	..
Subluxatio	2	..	..	..	..	..	..	..
Total	158	4	88	2	50	..	516	7

APPENDIX

Abstract of Results of Meteorological Observations

Aldershot Camp. Lat. 51° 15′ 23″ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
							Mean						Hygrometer.	
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.	Maximum in Sun's rays.	Minimum on Grass.	Dry Bulb.	Wet Bulb.
January	29·482	30·236	28·498	52·0	21·5	30·5	47·8	37·0	10·8	42·4	65·1	34·4	43·1	41·6
February	29·339	29·876	28·291	57·0	24·0	33·0	47·2	34·1	13·1	40·6	74·7	33·1	42·0	39·6
March	29·325	29·966	28·772	63·6	19·5	44·1	48·6	34·0	14·6	41·3	82·8	31·3	42·4	39·8
April	29·533	30·048	29·146	77·4	32·0	45·4	56·9	40·5	16·4	48·7	99·6	36·8	50·8	46·8
May	29·597	29·942	29·130	73·0	32·0	41·0	62·2	40·0	22·2	51·1	113·5	35·0	55·6	48·3
June	29·568	29·897	29·211	85·0	40·8	44·2	73·1	51·3	21·8	62·2	121·7	45·1	65·7	59·6
July	29·574	30·127	29·061	87·0	45·8	41·2	73·9	51·1	22·8	62·5	120·5	45·8	65·8	60·4
August	29·428	29·862	28·945	78·0	42·0	36·0	71·6	48·2	23·4	59·9	117·6	41·6	63·1	58·0
September	29·853	29·685	28·840	70·6	41·0	29·6	65·1	50·0	15·1	57·5	100·7	41·4	58·5	55·7
October... ...	29·068	30·048	29·300	70·4	33·4	37·0	59·0	46·4	12·6	52·7	88·1	42·1	53·7	51·7
November	29·550	29·960	28·875	58·2	25·0	33·2	51·3	37·5	13·8	44·4	77·4	33·3	45·8	43·6
December	29·545	30·063	28·920	56·0	26·0	30·0	48·6	36·5	12·1	42·5	63·2	31·9	43·6	42·1
Yearly Sums, Means, and Totals ...	29·497	29·959	28·916	69·0	31·9	36·9	58·6	42·2	16·6	50·5	93·7	37·6	52·5	48·9

Devonport. Lat. 50° 17′ N.

January	29·837	30·626	29·776	55·6	26·2	29·4	51·2	38·2	13·0	44·7	62·8	31·8	46·4	42·9
February	29·692	30·309	28·587	57·0	23·4	33·6	50·5	35·1	15·4	42·7	58·1	28·1	45·0	42·6
March	29·631	30·395	28·902	63·2	24·2	39·0	51·1	35·6	15·5	43·3	64·4	28·5	45·6	43·0
April	29·815	30·288	29·349	68·6	30·1	38·5	57·9	41·7	16·2	49·8	95·6	33·4	52·8	49·1
May	29·911	30·305	29·473	72·8	28·3	44·5	63·2	40·1	23·1	51·6	101·6	31·1	55·9	49·7
June	29·861	30·223	29·507	87·5	40·2	47·3	70·9	49·9	21·1	60·4	110·6	40·5	64·4	59·1
July	29·909	30·310	29·293	83·5	44·0	39·5	73·1	51·6	21·4	62·3	116·3	41·1	67·0	60·9
August	29·791	30·122	29·417	78·2	41·5	36·7	70·2	50·6	19·6	60·4	113·8	39·6	63·9	59·6
September	29·690	30·117	29·259	76·0	35·3	40·7	66·0	47·6	18·4	56·8	101·8	35·9	59·6	56·8
October	30·009	30·422	29·613	69·0	33·8	35·2	61·7	45·2	16·5	53·4	92·6	34·4	56·5	48·8
November	29·960	30·284	29·422	67·0	27·3	39·7	56·4	41·3	15·1	48·9	81·3	35·7	50·2	47·7
December	29·881	30·395	29·185	57·0	29·6	27·4	53·4	40·1	13·3	46·7	67·6	34·1	48·0	46·5
Yearly Sums, Means, and Totals ...	29·832	30·317	29·232	69·6	32·0	37·6	60·5	43·1	17·3	43·2	88·9	34·5	54·6	50·6

Portsmouth. Lat. 50° 45′ N.

January	29·902	30·752	28·701	53·7	28·1	25·6	49·8	39·3	10·5	44·5	58·8	32·6	46·0	43·2
February	29·737	30·284	28·670	55·4	29·1	26·3	49·4	37·2	12·2	43·3	68·3	30·9	44·9	42·0
March	29·689	30·375	29·149	62·1	26·1	36·0	49·2	35·3	13·9	42·2	75·1	29·1	44·1	40·6
April	29·888	30·385	29·423	68·5	35·0	33·5	57·5	41·9	15·6	49·7	95·5	37·0	52·1	47·4
May	29·982	30·375	29·359	71·8	34·2	37·6	62·5	42·6	19·9	52·5	102·4	38·5	55·6	48·5
June	29·959	30·313	29·611	90·6	42·2	48·4	73·8	52·9	20·4	63·1	112·8	47·8	65·2	58·6
July	29·955	30·333	29·362	87·0	46·5	40·5	75·8	54·3	21·5	65·0	111·9	50·2	66·7	59·1
August	29·820	30·159	29·386	82·0	47·8	34·2	71·4	53·7	17·7	62·5	108·2	49·3	64·3	57·7
September	29·755	30·137	29·158	77·8	45·0	32·8	65·7	51·9	13·8	58·8	96·4	48·1	59·7	55·2
October... ...	30·079	30·498	29·658	70·4	37·0	33·4	61·7	47·6	14·1	54·6	86·8	42·6	55·9	52·2
November	29·987	30·330	29·313	61·6	29·2	32·4	55·7	40·6	15·1	48·1	71·5	35·9	48·8	45·1
December	29·961	30·493	29·307	58·6	28·8	29·8	53·7	39·9	14·8	46·3	59·8	33·6	46·3	43·8
Yearly Sums, Means, and Totals ...	29·895	30·369	29·258	69·9	35·7	34·2	60·5	44·7	15·8	52·5	87·3	39·6	54·1	49·4

No. XXXIV.

taken at Home Stations in the Year 1866.

Long. 0° 45′ 36″ W. Height above Sea 325 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.												
		In a Cubic Foot of Air.				Number of Days for mean Direction of Wind.				Number of calm, or nearly calm, Days.	Calculated from Robinson's Anemometer.		Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	Amount of Rain fall.	
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.	Mean Weight of Cubic Foot of Air.	North.	East.	South.	West.		Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.				On the Ground.	25 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches.
39·8	·245	2·8	·4	88·1	543·2	2·00	1·00	10·00	18·00	0·00	...	472·0	7·9	4·0	20	5·67	3·97
36·6	·217	2·5	·6	82·2	541·8	6·00	0·50	8·00	13·50	0·00	...	428·0	7·7	3·7	18	4·24	2·70
36·0	·217	2·5	·6	80·8	541·2	7·50	6·50	7·50	9·50	0·00	...	338·0	8·1	2·5	13	1·84	1·26
42·6	·274	3·2	1·0	74·8	535·6	5·00	11·50	5·50	8·00	0·00	...	366·0	7·7	2·7	16	2·28	1·59
41·3	·262	2·9	2·1	59·1	531·8	7·50	11·00	3·50	9·00	0·00	...	306·0	6·7	2·5	9	1·37	1·08
54·6	·428	4·7	2·2	68·2	520·0	2·50	7·00	9·50	11·00	0·00	...	297·0	7·0	2·7	16	2·95	2·42
56·0	·450	5·0	2·0	71·0	519·8	8·00	7·00	2·00	14·00	0·00	...	248·0	7·3	2·6	10	2·24	1·94
53·8	·413	4·6	1·8	71·6	520·5	5·50	4·50	5·50	15·50	0·00	...	318·0	7·9	3·5	19	2·56	1·92
53·2	·406	4·5	1·0	82·7	523·6	1·00	3·50	10·50	15·00	0·00	...	280·0	8·1	3·2	26	5·02	3·43
49·8	·357	4·0	·6	86·7	534·3	9·50	12·00	5·50	4·00	0·00	...	212·0	8·0	2·2	14	1·47	1·14
41·1	·259	2·9	·6	84·4	541·3	5·00	1·50	6·00	17·50	0·00	...	334·0	7·4	3·3	15	1·71	0·99
40·3	·250	2·9	·4	88·0	543·5	1·50	1·00	10·00	18·50	0.00	...	298·0	7·8	2·9	18	2·13	1·66
45·6	·315	3·5	1·1	78·1	533·0	61·00	67·00	83·50	153·50	0·00	...	324·7	7.6	3·0	194	33·48	24·19

Long. 4° 5′ W. Height above Sea 35 feet.

38·9	·238	2·7	·9	76·0	545·9	2·50	1·75	9·75	15·00	2·00	...	320·7	7	3·0	25	6·35	5·77
39·8	·245	2·8	·6	82·2	544·9	5·50	1·50	5·25	14·25	1·50	...	265·5	7	3·0	22	5·25	4·77
40·1	·248	2·8	·7	81·4	543·2	7·75	7·50	8·50	6·75	0·50	...	253·6	7	3·0	16	3·21	2·80
45·4	·304	3·5	1·1	76·6	538·5	3·25	10·75	9·00	5·00	2·00	...	276·0	6	3·0	17	2·07	1·99
43·9	·290	3·2	1·8	64·9	537·0	4·75	12·25	6·75	6·75	0·50	...	255·4	5	4·0	14	3·00	2·86
54·7	·429	4·8	1·9	70·9	526·6	1·75	7·25	12·75	8·25	0·00	...	216·7	7	3·0	17	1·65	1·56
56·0	·450	5·0	2·3	67·6	524·5	3·25	8·75	7·00	12·00	0·00	...	198·4	6	3·0	10	1·66	1·59
56·0	·451	5·0	1·6	76·4	525·6	4·25	2·25	9·50	15·00	0·00	...	216·7	7	3·0	19	5·24	4·92
54·3	·423	4·7	1·0	83·8	528·4	2·75	1·00	12·75	13·00	0·50	...	267·3	7	3·0	28	9·60	9·23
41·6	·265	3·0	2·1	57·2	538·2	7·50	11·75	6·25	5·00	0·50	...	169·7	7	1·0	11	1·97	1·91
45·0	·300	3·4	·7	83·0	543·9	6·50	3·00	7·25	12·75	0·50	...	238·8	7	2·0	18	2·80	2·64
44·8	·297	3·4	·4	89·5	544·9	4·00	4·75	6·75	13·00	2·50	...	251.7	8	2·0	21	4·16	3·85
46·7	·328	3·7	1·3	75·8	536·8	53·75	72·50	101·50	126·75	10·50	...	244·2	6·7	2·7	218	46·96	43·39

Long. 1° 5′ W. Height above Sea 20 feet.

40·0	·248	2·9	·9	80·4	547·7	6·50	1·50	9·00	12·00	2·00	...	190·9	6·0	0·7	22	4·69	* ...
38.7	·234	2·7	·7	78·6	545·9	5·75	2·25	5·25	14·75	0·00	...	203·5	6·3	1·3	18	4·28	4·27
36·5	·215	2·5	·8	74·1	545·9	12·50	7·50	6·75	4·25	0·00	...	175·0	7·4	1·9	10	1·73	1·64
42·6	·273	3·1	1·3	70·5	540·7	5·25	10·25	6·50	8·00	0·00	...	200·5	5·4	2·5	14	1·59	1·57
47·8	·266	2·9	2·0	60·1	538·7	5·25	13·00	4·25	8·50	0·00	...	171·9	4·1	1·6	6	1·01	0·99
53·2	·405	4·5	2·4	65·2	527·5	2·25	8·75	9·00	10·00	0·00	...	143·1	4·5	2·9	13	1·88	1·84
53·0	·401	4·5	2·7	61·6	526·1	5·75	7·00	5·00	13·25	0·00	...	155·0	6·0	1·2	10	1·56	1·51
52·2	·391	4·4	2·3	64·6	526·3	2·75	5·75	6·50	16·00	0·00	...	...	5·9	1·2	19	2·55	2·26
51·2	·378	4·3	1·5	73·7	529·7	2·25	3·50	11·25	12·00	1·00	...	...	7·6	0·9	26	5·37	5·11
48·7	·346	3·9	1·1	77·7	539·6	10·75	12·00	3·75	4·50	0·00	...	141·5	6·0	0·8	10	1·57	1·54
41·1	·259	3·0	1·0	74·9	547·1	3·00	1·25	8·00	17·75	0·00	...	176·2	6·0	0·6	14	5·03	4·50
40·9	·257	3·0	·6	82·8	548·8	4·25	2·50	8·00	14·25	2·00	...	180·0	6.7	0·3	17	5·10	...
45·0	·306	3·5	1·4	72·0	538·7	66·25	75·25	83·25	135·25	5·00	...	...	6·0	1·3	179	36·46	...

* 20 feet above the ground.

Appendix No.

PARKHURST, ISLE OF WIGHT.

Lat. 50° 43′ N. Long

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of				Mean Temperature of Dew Point.
							Mean						Hygrometer		
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.	Maximum in Sun's rays.	Minimum on Grass.	Dry Bulb.	Wet Bulb.	
January	...	...	...	52·0	25·0	27·0	48·8	37·9	10·9	43·3	60·4	31·6	45·0	42·7	
February	...	...	...	54·0	25·0	29·0	48·8	35·1	13·7	41·9	65·2	29·5	44·3	41·8	40·0
March	...	...	...	60·0	22·0	38·0	47·6	34·1	13·5	40·8	73·8	24·4	43·8	40·4	39·9
April	...	...	.	72·0	31·0	41·0	57·3	40·7	16·6	49·0	97·0	36·4	54·1	48·5	36·4
May	...	...	..	69·0	29·6	39·4	61·6	40·2	21·4	50·9	114·6	35·2	56·2	50·2	43·0
June	...	...	...	88·0	43·0	45·0	71·8	50·0	21·8	60·9	125·3	45·0	63·6	61·9	44·7
July	...	...	...	83·0	44·0	39·0	72·6	51·8	20·8	62·2	117·3	47·4	66·6	63·1	60·5
August	...	...	.	77·0	45·0	32·0	70·3	51·1	19·2	60·7	117·7	45·9	64·1	59·6	60·3
September ...	...	..	...	72·0	37·4	34·6	64·6	50·2	14·4	57·4	93·0	45·7	59·7	57·2	55·8
October... ...	...	...	...	70·0	32·4	37·6	60·0	45·9	14·1	52·9	71·8	40·4	55·9	52·8	55·0
November ...	...	...	...	60·0	26·0	34·0	52·4	38·5	13·9	45·4	63·5	32·3	48·5	45·8	49·9
December ...	...	...	...	56·0	23·0	33·0	49·7	37·2	12·5	43·4	55·7	31·7	45·6	44·3	42·9
Yearly Sums, Means, and Totals ...	...	...	..	67·7	31·9	35·8	58·7	42·7	16·0	50·7	87·9	37·1	53·9	50·6	42·8
															47·5

NETLEY.

Lat. 50° 51′ 71″ N. Lon

January	29·825	30·628	28·695	53·2	24·0	29·2	48·6	35·8	12·8	42·2	67·3	...	44·8	42·9	
February	29·664	30·230	28·555	56·2	24·0	32·2	48·5	34·1	14·4	41·3	69·6	...	43·8	40·6	
March	29·636	30·294	29·034	60·5	21·0	39·5	48·1	32·3	15·8	40·2	75·4	...	43·1	40·3	40·7
April	29·839	30·316	29·374	69·6	32·0	37·6	56·8	38·9	17·9	47·8	93·4	...	52·0	48·0	36·9
May	29·916	30·355	29·426	70·0	28·2	41·8	61·6	37·7	23·9	49·6	106·4	34·4	55·5	49·1	38·9
June	29·887	30·114	29·598	86·0	40·0	46·0	71·1	48·7	22·4	59·9	114·6	45·1	65·3	60·3	43·9
July	29·889	30·301	29·358	84·0	42·0	42·0	72·9	50·5	22·4	61·7	115·4	46·5	66·2	61·7	43·0
August	29·765	30·091	29·326	84·0	41·0	43·0	72·0	50·1	21·9	61·0	107·2	45·8	63·3	60·2	56·2
September ...	29·686	30·058	29·156	72·0	36·2	35·8	64·4	48·7	15·7	56·5	100·1	45·6	59·0	56·1	58·0
October... ...	29·954	30·415	29·625	71·2	29·0	42·2	60·4	43·4	17·0	51·9	88·2	39·4	55·8	53·3	57·6
November ...	29·967	30·225	29·245	64·0	24·0	40·0	52·7	37·2	15·5	44·9	75·9	31·8	48·1	45·0	53·5
December ...	29·917	30·443	29·229	57·0	22·8	34·2	48·9	37·0	11·9	42·9	60·3	31·7	45·1	43·5	50·9
Yearly Sums, Means, and Totals ...	29·829	30·289	29·218	69·0	30·3	38·5	58·8	41·2	17·6	50·0	89·5	...	53·5	50·1	41·6
															46·7

DOVER.

Lat. 51° 8′ N. L

January	...	...	...	51·5	25·5	26·0	47·9	36·5	11·4	42·2	...	...	44·6	42·5	
February	...	...	...	54·0	25·5	28·5	47·3	33·8	13·5	40·5	...	...	43·6	41·7	
March	...	...	...	60·5	26·0	34·5	43·7	33·5	10·2	38·6	...	...	42·6	39·9	40
April	...	...	...	75·0	35·0	40·0	55·2	40·7	14·5	47·9	...	...	50·9	47·5	39
May	...	...	...	68·5	34·5	34·0	57·5	41·4	16·1	49·4	...	...	53·6	49·4	36
June	...	...	...	79·5	39·0	40·5	68·8	50·0	18·8	59·4	...	...	63·7	59·3	43
July	...	...	...	81·0	45·5	35·5	68·4	51·0	17·4	59·7	...	...	63·5	59·1	45
August	...	...	...	74·5	45·0	29·5	66·4	50·2	16·2	58·3	...	...	61·5	58·0	55
September ...	...	...	...	75·0	42·5	32·5	63·6	49·3	14·3	56·4	...	...	59·3	56·2	55
October... ...	...	...	...	67·5	35·0	32·5	58·3	45·3	13·0	51·8	...	...	54·8	51·9	45
November ...	...	...	...	59·0	26·0	33·0	50·6	36·7	13·9	43·6	...	...	47·2	44·6	53
December ...	...	...	...	54·0	24·0	30·0	47·9	36·0	11·9	41·9	...	...	44·4	42·4	49
Yearly Sums, Means, and Totals ...	...	...	...	66·6	33·6	33·0	56·3	42·0	14·2	49·1	...	...	52·4	48·9	41
															40
															45

No. XXXIV—*continued.*

Long. 1° 16′ W. Height above Sea 200 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.											
		In a Cubic Foot of Air.				Number of Days for mean Direction of Wind.					Calculated from Robinson's Anemometer.					Amount of Rain fall.	
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.	Mean Weight of Cubic Foot of Air.	North.	East.	South.	West.	Number of calm, or nearly calm, Days.	Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.	Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	On the Ground.	23 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
40·0	·247	2·8	0·6	82·9	...	1·50	0·50	8·00	19·00	2·00	...	...	6·3	...	22	5·51	...
38·9	·237	2·7	0·6	80·8	...	7·00	1·00	3·00	12·00	0·00	...	...	5·6	...	18	7·73	...
36·4	·214	2·5	0·8	74·8	...	11·50	6·50	5·50	7·50	0·00	...	...	7·2	...	11	1·93	...
43·0	·276	3·1	1·6	66·1	...	4·00	10·50	5·50	9·00	1·00	...	...	6·4	...	14	2·04	...
44·7	·297	3·3	1·7	65·2	...	6·00	10·50	3·00	9·50	2·00	...	...	4·5	...	6	0·99	...
60·5	·528	5·8	0·7	90·4	...	3·50	4·00	7·50	14·00	1·00	...	...	5·3	...	12	2·01	...
60·3	·523	5·7	1·4	80·5	...	3·50	5·50	2·00	15·00	5·00	...	...	5·9	...	11	1·34	...
55·8	·448	4·9	1·6	74·6	...	5·00	1·50	6·00	14·50	4·00	...	...	6·6	...	12	2·49	...
55·0	·433	4·8	0·9	85·0	...	2·00	0·00	6·50	19·50	2·00	...	...	7·5	...	28	9·75	...
49·9	·362	4·0	0·9	81·3	...	10·00	7·50	5·50	7·00	1·00	...	...	6·3	...	8	1·26	...
42·9	·276	3·2	0·7	81·6	...	7·50	0·50	3·50	17·50	1·00	...	...	6·3	...	15	2·80	...
42·8	·276	3·1	0·4	90·2	...	5·50	2·00	6·50	16·00	1·00	...	...	7·3	...	18	2·82	...
47·5	·343	3·8	0·9	79·4	...	67·00	50·00	67·50	160·50	20·00	...	...	6·2	...	165	40·67	...

Long. 1° 20′ 24″ W. Height above Sea 47 feet.

40·7	·254	2·9	·5	86·4	547·5	2·50	0·50	9·50	16·50	2·00	...	347·2	7·6	4·4	23	4·80	...
36·9	·218	2·5	·7	76·0	545·8	7·25	0·75	6·00	14·00	0·00	...	335·3	7·7	3·9	21	4·29	...
36·9	·220	2·5	·6	79·1	546·0	11·00	5·25	7·50	7·25	0·00	...	251·2	8·3	3·4	11	2·04	1·45
43·9	·287	3·3	1·1	74·0	539·7	4·50	8·00	10·25	7·25	0·00	...	272·0	7·3	3·3	16	2·47	1·77
43·0	·279	3·1	1·9	63·5	537·5	4·50	6·50	10·25	9·75	0·00	...	236·8	6·1	2·8	9	1·47	1·01
46·2	·453	5·0	1·9	73·9	525·8	2·00	2·75	14·75	10·50	0·00	...	244·5	7·2	3·8	14	1·69	1·17
58·0	·484	5·3	2·1	75·7	524·8	5·25	6·00	6·75	13·00	0·00	...	243·6	7·2	3·1	10	1·61	1·20
57·6	·476	5·2	1·2	81·7	525·5	5·75	0·75	8·25	16·25	0·00	...	280·2	8·0	4·1	13	3·09	2·15
53·5	·410	4·6	1·0	82·6	528·9	2·50	2·25	9·25	16·00	0·00	...	362·7	8·5	5·2	24	6·50	4·84
50·9	·374	4·2	·8	84·8	537·2	11·50	9·25	4·75	5·50	0·00	...	168·5	7·6	3·7	12	2·25	2·05
41·6	·262	3·0	·8	78·4	547·4	6·25	1·25	4·00	18·00	0·50	...	277·4	7·0	4·4	14	2·11	1·40
41·7	·263	3·0	·4	87·9	548·8	4·50	0·75	9·25	16·00	0·50	...	300·8	8·0	4·7	18	1·90	0·95
46·7	·332	3·7	1·1	78·5	537·9	67·50	44·00	100·50	150·00	3·00	...	276·7	7·5	3·9	185	34·22	...

Long. 1° 19′ E. Height above Sea 325 feet.

40·1	·248	2·9	·5	84·4	...	4·50	0·75	10·50	15·25	0·00	...	...	...	4·5	20	4·46	...
39·5	·243	2·8	·5	85·4	...	7·25	0·75	6·50	13·50	0·00	...	...	...	5·4	24	3·57	...
36·7	·217	2·5	·6	80·1	...	9·50	7·25	8·00	5·75	0·50	...	...	...	5·9	19	2·23	...
43·9	·288	3·3	·9	77·6	...	5·75	8·25	6·25	8·25	1·50	...	...	...	5·9	15	2·11	...
45·3	·302	3·4	1·2	78·4	...	7·25	9·50	5·25	7·50	1·50	...	...	...	6·2	13	1·17	...
55·5	·444	4·9	1·6	75·7	...	3·00	5·50	7·50	8·00	6·00	...	...	...	6·3	16	2·47	...
55·4	·440	4·9	1·6	75·3	...	5·25	7·25	7·50	9·00	2·00	...	...	...	6·1	12	2·18	...
45·6	·307	3·5	2·6	56·0	...	4·00	2·75	9·25	14·50	0·50	...	...	...	5·9	22	4·17	...
53·7	·413	4·6	1·0	82·3	...	3·50	1·50	9·25	13·75	2·00	...	...	...	6·1	26	5·55	...
49·1	·348	4·0	·9	80·6	...	9·00	10·75	4·50	5·25	1·50	...	...	...	5·2	12	0·88	...
41·7	·264	3·0	·7	82·0	...	10·00	0·50	5·00	14·50	0·00	...	...	...	4·1	19	2·48	...
40·0	·248	2·8	·5	84·8	...	7·00	0·50	8·25	14·75	0·50	...	...	...	4·0	21	1·81	...
45·5	·313	3·5	1·0	78·1	...	76·00	55·25	87·75	130·00	16·00	...	...	...	5·4	219	33·08	...

Appendix

Shorncliffe Camp. Lat. 51° 5′ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings o			
							Mean						Hygrome	
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.	Maximum in Sun's rays.	Minimum on Grass.	Dry Bulb.	Wet Bulb.
January	29·755	30·469	28·671	57·9	26·8	31·1	49·7	37·7	12·0	43·7	60·3	30·3	43·6	42
February	29·588	30·144	28·798	56·9	26·9	30·0	48·5	34·5	14·0	41·5	69·5	27·5	42·2	40
March	29·558	30·214	29·024	60·2	26·1	34·1	47·5	33·8	13·7	40·6	83·1	27·4	41·9	39
April	29·755	30·263	29·236	73·8	34·6	39·2	57·2	41·7	15·5	49·4	105·5	33·0	50·3	47
May	29·822	30·218	29·247	71·1	33·4	37·7	60·2	41·8	18·4	51·0	108·9	30·4	53·7	49
June	29·795	30·111	29·390	80·9	40·2	40·7	71·2	51·9	19·3	61·5	122·4	43·1	63·6	60
July	29·729	30·029	29·264	81·7	45·9	35·8	70·0	52·2	17·8	61·1	121·6	40·8	62·6	59
August	29·676	29·982	29·181	76·4	46·0	30·4	68·5	50·1	18·4	59·3	110·0	41·7	60·8	58
September	29·632	30·001	29·039	76·3	41·6	34·7	66·8	49·6	17·2	58·2	107·6	43·1	58·9	56
October...	29·901	30·358	29·524	76·8	33·1	43·7	59·8	46·0	13·8	52·9	86·6	39·2	54·0	51
November	29·844	30·177	29·143	60·6	23·6	37·0	51·4	36·2	15·2	43·8	65·1	29·5	45·9	44
December	29·867	30·395	29·195	59·8	25·8	34·0	49·0	35·5	13·5	42·2	55·9	28·3	43·7	42
Yearly Sums, Means, and Totals ...	29·743	30·197	29·143	69·4	33·7	35·7	58·3	42·6	15·7	50·4	91·4	34·5	51·8	49

Fort Pitt, Chatham. Lat. 51° 23′ N.

January	29·743	30·576	29·650	53·0	30·5	22·5	48·0	37·7	10·3	42·8	60·0	34·6	44·6	42
February	29·570	30·162	28·444	55·3	23·2	32·1	47·2	34·2	13·9	40·7	65·9	31·7	42·5	40
March	29·552	30·261	29·056	61·9	21·4	40·5	48·1	33·3	14·8	40·6	77·9	30·0	43·1	40
April	29·776	30·285	29·247	77·2	31·4	45·8	56·9	40·7	16·2	48·8	90·8	35·5	51·2	47
May	29·836	30·242	29·276	67·7	32·0	35·7	60·0	40·1	19·9	50·0	96·2	33·6	54·6	50
June	29·795	30·113	29·387	84·2	39·5	44·7	72·0	50·5	21·5	61·2	110·4	46·3	65·9	61
July	29·785	30·184	29·258	85·6	43·6	42·0	72·4	51·9	20·5	62·1	106·2	47·1	65·7	61
August	29·653	29·946	29·195	79·4	43·0	36·4	70·1	50·9	19·2	60·5	103·7	47·0	63·4	59
September	29·573	29·962	29·050	73·1	40·1	33·0	64·5	49·1	15·4	56·8	91·9	45·7	59·4	56
October...	29·957	30·335	29·546	68·0	30·8	37·2	58·8	45·2	13·6	52·0	76·1	41·8	54·5	52
November	29·807	30·174	29·390	60·1	25·7	34·4	51·1	37·0	14·1	44·0	66·9	33·0	46·4	44
December	29·829	30·479	29·130	57·0	24·6	32·4	48·4	34·9	13·5	41·6	60·3	30·0	44·1	42
Yearly Sums, Means, and Totals ...	29·740	30·227	29·219	68·5	32·1	36·4	58·1	42·1	16·0	50·1	83·9	38·0	52·9	50

Sheerness. Lat. 51° 23′ N.

January	...	...	...	55·0	25·0	30·0	48·0	34·0	14·0	41·0	...	...	44·3	42
February	...	...	...	55·0	24·0	31·0	47·6	32·0	15·6	39·8	...	...	43·1	40
March	...	...	...	63·5	23·0	40·5	49·1	31·5	17·6	40·3	...	...	43·7	41
April	...	...	...	73·0	31·0	42·0	57·3	36·9	20·4	47·1	...	...	51·3	47
May	...	...	...	69·0	32·0	37·0	60·4	39·2	21·2	49·8	...	...	54·2	49
June	...	...	...	83·0	40·0	43·0	72·3	50·6	21·7	61·4	...	...	66·1	61
July	...	...	...	87·0	44·5	42·5	73·4	52·3	21·1	62·8	...	...	66·3	61
August... ...	...	...	...	81·5	43·0	38·5	70·7	50·2	20·5	60·4	...	...	63·9	60
September	...	...	...	75·0	36·0	39·0	65·6	48·6	17·0	57·1	...	...	60·1	56
October	...	...	...	66·0	33·0	33·0	59·1	44·7	14·4	51·9	...	...	54·7	52
November	...	...	...	60·5	28·0	32·5	51·8	35·5	16·3	43·6	...	...	47·0	45
December	...	...	...	57·0	24·0	33·0	48·5	34·6	14·8	41·2	...	...	44·2	43
Yearly Sums, Means, and Totals ...	...	...	...	68·7	32·0	36·8	58·6	40·7	17·8	49·7	...	...	53·2	50

No. XXXIV—*continued.*

Long. 1° 10′ E. Height above Sea 220 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.											
		In a Cubic Foot of Air.				Number of Days for mean Direction of Wind.					Calculated from Robinson's Anemometer.					Amount of Rain fall.	
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.	Mean Weight of Cubic Foot of Air.	North.	East.	South.	West.	Number of calm, or nearly calm, Days.	Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.	Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	On the Ground.	20 Feet above the Ground.
											lbs. per sq. foot.	Miles				Inches	Inches
40·3	·251	2·9	·4	88·0	547·5	4·25	0·50	10·00	16·25	0·00	...	...	6·5	5·5	18	4·01	...
39·3	·241	2·8	·4	89·9	546·0	5·75	0·50	7·00	14·75	0·00	...	...	7·0	7·0	23	4·53	...
36·7	·220	2·5	·6	83·4	545·8	10·00	5·75	8·00	7·25	0·00	...	...	7·9	6·5	15	2·34	1·84
43·5	·283	3·3	·9	78·2	540·0	5·25	9·50	5·25	10·00	0·00	...	...	5·3	5·9	12	1·25	1·05
45·2	·301	3·4	1·2	72·9	537·6	6·50	10·25	6·75	7·50	0·00	...	364·5	5·5	5·7	8	0·65	0·57
57·4	·473	5·2	1·3	80·2	525·8	3·00	8·25	7·50	9·75	1·50	...	318·5	4·6	5·9	12	2·51	2·18
55·9	·448	5·0	1·3	79·0	525·7	7·50	6·75	5·75	11·00	0·00	...	309·3	5·4	6·3	11	2·33	1·69
56·9	·464	5·1	·8	87·4	517·7	4·50	4·50	5·75	14·25	2·00	...	324·1	6·3	6·2	20	4·44	3·75
54·3	·424	4·7	·9	84·6	528·0	3·75	3·75	8·50	13·00	1·00	...	457·1	6·1	5·8	23	4·84	3·52
49·4	·352	4·0	·7	84·2	538·4	11·75	11·25	4·25	3·25	0·50	...	320·6	4·5	5·0	8	0·57	0·51
41·9	·265	3·0	·5	85·7	546·5	5·50	1·50	3·50	19·00	0·50	...	399·5	5·3	6·5	14	2·67	2·00
40·2	·250	2·8	·4	87·2	549·3	4·75	1·00	7·75	16·50	1·00	...	390·2	6·5	6·4	18	1·80	1·22
46·7	·331	3·7	0·8	83·4	537·4	72·50	63·50	80·00	142·50	6·50	...	...	5·8	6·1	182	31·94	...

Long. 0° 32′ 28″ E. Height above Sea 160 feet.

40·3	·250	2·9	·5	85·2	546·2	1·50	0·25	12·50	13·75	3·00	...	262·5	7·5	...	22	4·05	...
37·8	·228	2·6	·5	84·3	545·5	3·25	0·75	9·75	13·75	0·50	...	325·0	7·9	...	19	5·04	..
37·3	·227	2·6	·6	81·5	544·4	6·75	6·25	9·25	8·25	0·50	...	...	7·7	2·3	22	2·32	...
44·6	·294	3·3	·9	78·4	539·4	3·25	13·25	5·75	7·75	0·00	...	...	7·5	2·9	21	2·81	..
46·8	·319	3·6	1·2	74·6	536·7	5·00	14·00	5·00	7·00	0·00	...	216·5	5·8	2·4	13	0·77	...
58·0	·485	5·3	1·7	76·5	523·4	1·25	7·75	12·00	8·00	1·00	...	147·4	6·3	2·3	14	4·02	...
57·2	·469	5·2	1·8	74·5	523·5	5·75	7·75	4·50	12·50	0·50	...	161·3	7·3	3·1	12	1·99	...
55·3	·438	4·9	1·6	75·4	523·7	1·75	3·75	8·75	14·25	2·50	...	192·1	7·8	2·4	19	3·31	...
53·9	·416	4·6	1·0	83·0	526·5	0·50	2·75	11·75	12·50	2·50	...	243·8	8·1	3·4	26	6·00	...
51·4	·379	4·3	·5	89·3	538·6	6·00	10·00	6·00	5·00	4·00	...	137·7	7·2	2·9	15	1·15	...
42·3	·271	3·1	·5	86·7	545·1	3·25	1·00	7·50	17·25	1·00	...	271·1	6·4	1·1	18	1·89	...
40·8	·255	2·9	·4	88·2	548·2	1·25	1·00	9·50	17·25	2·00	...	215·4	7·8	2·4	16	1·71	...
47·2	·336	3·8	0·9	81·5	536·8	39·50	68·50	102·25	137·25	17·50	...	...	7·2	...	217	35·06	...

Long. 0° 49′ E. Below Sea 2 feet.

41·0	·258	3·0	0·4	88·6	...	5·25	3·00	6·25	16·50	0·00	...	...	8·2	4·2	13	2·87	...
38·3	·231	2·7	0·5	82·7	...	4·25	0·75	2·75	20·25	0·00	...	...	6·6	4·3	15	3·08	...
38·1	·229	2·6	0·6	79·9	...	10·00	6·00	5·50	9·50	0·00	...	...	6·2	4·2	12	1·78	...
43·8	·287	3·3	1·0	76·1	...	4·50	13·00	2·50	10·00	0·00	...	...	6·1	5·0	13	2·34	...
44·7	·296	3·4	1·4	70·6	...	8·00	13·25	1·25	8·50	0·00	...	...	4·1	4·0	7	0·77	...
58·0	·482	5·3	1·7	75·6	...	3·50	7·75	5·50	13·25	0·00	...	...	4·4	3·1	11	2·58	...
57·5	·474	5·2	1·8	73·8	...	6·75	8·00	1·50	14·75	0·00	...	...	5·6	3·8	9	2·14	...
57·0	·466	5·1	1·4	78·1	...	5·75	3·75	4·50	17·00	0·00	...	...	6·1	4·4	12	3·11	...
54·1	·419	4·7	1·1	80·9	...	3·00	2·75	7·00	17·25	0·00	...	...	6·7	4·6	10	3·71	...
50·2	·363	4·1	0·7	84·6	...	10·00	11·00	4·00	6·00	0·00	...	...	5·9	3·3	6	0·96	...
44·3	·291	3·3	0·4	90·9	...	7·75	0·25	4·25	17·75	0·00	...	...	5·0	3·5	9	1·28	...
41·6	·263	3·0	0·3	90·6	...	2·50	0·75	9·00	18·75	0·00	...	...	7·3	4·6	15	1·27	...
47·3	·338	3·8	0·9	80·9	...	71·25	70·25	54·00	169·50	0·00	...	...	6·0	4·0	142	25·89	..

Appendix

COLCHESTER CAMP. Lat. 51° 53′ N.

Month	Readings of the Barometer. Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Temperature of the Air. Highest during Month.	Lowest during Month.	Range during Month.	Mean. Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.	Mean Daily Readings of Maximum in Sun's rays.	Minimum on Grass.	Hygrometer. Dry Bulb.	Wet Bulb.
January	29·728	30·510	28·850	54·2	16·2	38·0	47·3	34·8	12·5	41·0	53·9	31·1	43·3	41·5
February	29·556	30·163	28·632	57·3	23·1	34·7	48·2	35·3	12·9	41·7	58·8	29·7	42·5	40·4
March	29·604	30·246	29·016	62·0	21·4	40·6	48·9	33·2	15·7	41·0	74·4	28·8	43·6	41·5
April	29·797	30·241	29·314	77·2	33·1	44·1	58·2	39·5	18·7	48·8	88·7	35·7	52·1	47·2
May	29·856	30·322	29·378	70·2	30·6	39·6	61·1	40·1	21·0	50·6	95·4	36·5	55·1	48·7
June	29·209	30·140	29·391	85·6	40·3	45·3	74·9	50·5	24·4	62·7	110·2	48·1	67·3	60·5
July	29·846	30·211	29·236	85·4	42·5	42·9	72·8	51·0	21·8	61·9	108·8	47·3	65·7	60·4
August	29·638	29·993	29·119	81·4	42·4	39·0	69·4	50·3	19·1	59·8	103·3	46·6	63·7	58·6
September ...	29·606	29·991	29·070	76·4	36·7	39·7	65·9	48·7	17·2	57·3	95·3	44·9	60·4	57·4
October... ...	29·970	30·385	29·530	72·5	31·5	41·0	60·6	45·3	15·3	52·9	84·9	41·0	55·3	52·9
November ...	29·794	30·163	29·627	60·4	25·9	34·5	51·4	35·3	16·1	43·3	63·0	31·5	46·4	44·3
December ...	29·821	30·400	29·115	56·5	26·1	30·4	48·3	34·7	13·6	41·5	61·1	31·7	43·8	42·1
Yearly Sums, Means, and Totals ...	29·702	30·239	29·140	70·0	30·8	39·1	58·9	41·6	17·3	50·2	83·1	37·7	53·3	49·6

EDINBURGH CASTLE. Lat. 55° 57′ N.

January	29·119	30·024	28·223	54·0	18.5	35·5	46·4	31·8	14·6	39·1	51·2	31·1	40·7	38·3
February	29·073	29·915	28·486	52·0	24·0	28·6	43·0	29·6	13·4	36·3	69·8	29·2	38·6	36·5
March	29·132	30·044	28·337	59·0	20·0	39·0	44·9	29·1	15·8	37·0	69·6	28·6	40·3	37·9
April	29·487	30·151	28·918	62·8	27·0	35·8	52·3	34·2	18·1	43·2	85·7	32·4	45·7	42·4
May	29·476	30·098	28·900	73·5	29·0	44·5	59·2	37·6	21·6	48·4	95·1	36·3	52·4	46·5
June	29·442	29·786	28·886	82·0	36·6	46·4	66·6	46·4	20·1	56·5	...	44·8	59·1	54·7
July	29·503	29·810	28·694	85·0	44·0	41·0	65·8	49·0	16·8	57·4	...	40·9	59·2	54·2
August	29·260	29·610	28·477	72·0	37·5	34·5	63·6	46·9	16·7	55·2	...	45·5	57·1	53·5
September ...	29·117	29·747	28·439	66·5	37·0	29·5	59·9	44·0	15·9	51·9	...	42·1	54·9	51·4
October... ...	29·626	30·104	29·006	62·5	32·0	30·5	54·8	42·2	12·6	48·5	...	40·5	50·3	47·8
November ...	29·331	29·732	28·866	56·0	25·0	31·0	48·4	34·4	14·0	41·4	...	32·2	42·9	40·9
December ...	29·260	29·968	28·400	57·0	27·0	30·0	48·4	33·7	14·7	41·0	...	32·1	41·6	39·7
Yearly Sums, Means, and Totals ...	29·319	29·916	28·636	65·2	29·7	35·5	54·4	38·2	16·2	46·3	...	36·3	48·6	45·3

ATHLONE. Lat. 53° 25′ N.

January	...	...	...	53·2	26·0	27·2	47·0	34·9	12·1	40·9	...	...	41·8	40·5
February	...	...	...	53·8	21·4	32·4	46·9	31·2	15·7	39·0	...	...	40·4	38·7
March	...	...	...	62·0	21·0	41·0	49·3	32·2	17·1	40·7	...	...	43·5	41·3
April	...	...	...	70·6	31·2	39·4	57·7	38·1	19·6	47·9	...	...	51·6	47·9
May	...	...	...	72·8	26·8	46·0	61·1	38·1	23·0	49·6	...	...	55·9	51·2
June	...	...	...	85·6	38·0	47·6	72·6	47·3	25·3	64·9	...	...	61·2	59·1
July	...	...	...	87·0	41·0	46·0	85·8	50·4	35·4	68·1	...	...	64·8	62·4
August	...	...	...	78·6	36·6	42·0	68·2	47·7	20·5	52·9	...	...	61·6	60·2
September ...	...	...	...	67·4	32·0	35·4	62·8	42·0	20·8	52·4	...	...	55·8	53·8
October	...	...	...	67·2	29·6	37·6	58·1	43·2	14·9	50·6	...	...	52·6	50·9
November ...	...	...	...	56·4	26·0	30·4	51·1	36·6	14·5	43·8	...	...	45·7	44·6
December ...	...	...	...	59·0	27 2	31·8	49·8	35·4	14·4	42·6	...	...	44·2	43·2
Yearly Sums, Means, and Totals ...	...	...	...	67·8	29·7	38·0	59·2	39·7	19·4	49·4	...	...	51·5	49·4

No. XXXIV—*continued*

Long. 0° 54′ E. Height above Sea 109 feet.

Hygrometrical Results from Glaisher's Tables.					Atmospherical Conditions.											
		In a Cubic Foot of Air.			Number of Days for mean Direction of Wind.					Calculated from Robinson's Anemometer.					Amount of Rain fall.	
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.	Mean Weight of Cubic Foot of Air.	North.	East.	South.	West.	Number of calm, or nearly calm, Days.	Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.	Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	On the Ground.	20 Feet above the Ground.
											lbs. per sq. foot	Miles				inches	inches
39·4	·241	2·8	·4	85·9	547·3	3·00	1·50	11·50	15·00	0·00	...	223·7	7·0	1·1	17	2·03	1·82
37·9	·228	2·6	·5	84·3	545·1	4·00	2·00	9·00	13·00	0·00	...	220·0	7·5	1·0	17	3·25	3·08
39·1	·238	2·7	·5	83·8	544·8	9·50	7·00	8·50	6·00	0·00	...	193·0	7·1	1·3	17	1·65	1·59
42·4	·271	3·1	1·3	70·0	539·0	7·50	11·00	5·50	6·00	0·00	...	201·2	7·0	3·0	17	1·62	1·57
42·5	·273	3·0	1·9	63·1	536·8	6·50	10·50	8·00	6·00	0·00	...	204·0	6·0	4·0	11	1·28	1·20
55·1	·436	4·8	2·6	64·8	512·2	4·50	6·00	9·50	10·00	0·00	...	194·6	6·5	3·1	9	2·92	2·86
56·0	·446	5·0	1·9	71·5	524·7	9·50	6·50	6·00	9·00	0·00	...	183·3	7·0	2·5	13	3·39	3·22
54·3	·424	4·7	1·8	72·2	523·2	6·00	4·50	8·00	12·50	0·00	...	203·0	8·0	3·5	14	3·36	3·28
54·8	·430	4·8	1·1	82·4	526·0	3.00	4·00	12·50	10·50	0·00	...	214·1	7·8	2·5	21	3·41	3·36
50·6	·371	4·1	·8	84·9	538·2	7·50	9·50	6·00	8·00	0·00	...	159·0	7·0	1·1	6	0·56	0·50
41·9	·267	3·1	·6	85·3	545·1	6·50	1·00	7 00	15·50	0·00	...	261·2	6·8	1·5	14	2·33	2·23
40·1	·249	2·8	·5	86·4	548·5	2·00	1·00	11·50	16·50	0·00	...	197·8	8·0	0·7	15	2·22	2·09
46·2	·323	3·6	1·1	77·9	535·9	69·50	64·50	103·00	128·00	0·00	...	204·7	7·1	2·1	169	28·02	26·80

Long. 3° 11′ W. Height above Sea 402 feet.

																	*
35·3	·205	2·4	·6	81·5	539·2	9·00	5·00	6·50	10·50	0·00	...	302·0	6·7	0·5	14	1·93	1·73
33·7	·194	2·2	·5	83·4	540·7	10·00	7·00	4·00	6·00	1·00	...	299·6	5·6	0·7	12	1·82	1·52
34·8	·203	2·4	·6	81·4	540·0	6·50	6·50	8·00	9·00	1·00	...	265·0	7·1	1·5	11	1·06	0·93
38·6	·236	2·7	·8	76·6	540·4	8·50	6·50	3·50	9·50	2·00	...	245·2	6·9	0·4	16	1·88	1·72
40·5	·253	2·9	1·6	64·9	533·1	11·25	7·00	3·25	8·50	1·00	...	204·2	5·8	0·6	12	1·46	1·44
50·7	·371	4·2	1·4	74·0	524·8	7·00	6·75	6·00	8·75	1·50	...	211·5	7·5	0·9	18	1·73	1·41
49·7	·357	4·0	1·6	71·0	525·9	7·25	8·25	4·25	8·75	2·50	...	211·1	6·7	0·5	14	4·18	3·78
50·1	·363	4·0	1·2	77·5	523·7	9·25	6·00	4·75	11·00	0·00	...	217·1	8·2	0·4	25	2·69	2·41
48·0	·334	3·8	1·0	77·0	523·8	3·25	2·25	10·75	11·25	2·50	...	195·9	7·5	0·4	21	3·45	3·14
45·1	·301	3·4	·7	83·0	537·6	4·25	7·75	9·50	8·50	1·00	...	...	7·4	0·3	17	1·32	1·15
38·6	·234	2·7	·5	85·0	540·5	7·50	5·25	5·25	11·00	1·00	...	...	6·7	0·4	19	2·89	2·48
37·3	·225	2·6	·5	86·0	540·7	8·50	4·50	6·50	10·50	1·00	...	...	7·5	1·7	21	2·18	1·99
41·9	·273	3·1	0·9	78·4	534·1	92·25	72·75	72·25	113·25	14·50	...	...	7·0	0·7	200	26·51	23·65

Long. 7° 56′ W. Height above Sea 304 feet.

38·9	·238	2·7	·3	90·4	...	3·00	1·00	9·50	17·50	0·00	...	...	6·2	4·9	26	5·01	...
36·5	·216	2·5	·4	86·8	..	5·00	1·00	5·50	16·50	0. 00	...	...	5·0	5·1	23	2·94	...
38·7	·235	2·7	·5	82·9	...	8·00	8.50	4·50	10·00	0·00	...	...	6·8	5·0	19	2·24	...
44·2	·290	3·3	1·0	76·4	...	5·00	10·50	8·50	6·00	0·00	...	...	5·6	5·1	20	1·72	...
46·8	·322	3·6	1·3	71·7	...	6·00	9·00	7·50	8·50	0·00	...	...	5·0	5·2	12	1·95	...
57·4	·470	5·2	·8	87·4	...	5·50	6·50	8·50	9·50	0·00	...	...	5·4	5·7	19	3·01	...
60·4	·527	5·8	·9	86·4	...	7·00	5·50	7·00	11·50	0·00	...	...	3·1	5·5	13	1·39	...
59·0	·501	5·6	·6	91·6	...	4·00	3·00	10·00	14·00	0·00	...	...	2·6	6·0	19	2·54	...
51·9	·389	4·3	·6	87·8	...	3·50	2·00	12·00	12·50	0·00	...	...	2·4	5·7	22	4·62	...
49·2	·351	3·9	·5	88·7	...	6·50	6·00	8 00	8·50	2·00	...	...	3·1	4·3	9	2·27	...
43·3	·281	3·2	·3	91·9	...	3·00	2·50	13·00	11·50	0·00	...	...	3·5	5·6	16	1·96	...
42·0	·267	3·0	·3	92·2	...	2·50	3·00	13·00	11·50	1·00	...	...	3·6	5·7	23	3·22	...
47·3	·340	3·8	0·6	86·1	...	59·00	58·50	107·00	137·50	3·00	...	...	4·3	5·3	221	32·87	...

* 120 feet above the ground.

Appendix

CURRAGH CAMP. Lat. 53° 8′ 57″ N.

Month.	Readings of the Barometer.			Temperature of the Air.			Mean				Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.	Maximum in Sun's rays.	Minimum on Grass.	Hygrometer. Dry Bulb.	Hygrometer. Wet Bulb.
January	29·257	30·130	28·495	52·2	25·0	27·2	45·9	34·7	11·2	40·3	53·9	31·3	41·5	40·4
February	29·165	29·957	28·501	53·3	22·5	31·0	44·9	31·3	13·6	38·1	64·7	27·4	39·1	37·6
March	29·176	30·068	28·187	67·0	17·5	49·5	46·4	32·6	13·8	39·5	71·2	28·6	41·3	37·9
April	29·379	29·873	28·903	69·6	29·9	39·7	54·2	38·6	15·6	46·4	86·4	35·1	48·6	45·3
May	29·493	29·868	28·988	71·5	27·9	43·6	59·1	39·0	20·1	49·0	94·1	34·1	53·3	47·9
June	29·405	29·723	28·387	82·9	37·8	45·1	65·1	47·5	17·6	56·3	98·2	43·6	59·1	55·2
July	29·455	29·853	28·768	82·0	40·1	41·9	71·0	49·2	21·8	60·1	104·9	46·1	63·4	58·7
August	29·278	29·650	28·692	71·9	39·5	32·4	64·7	47·4	17·3	56·0	89·4	43·5	58·9	55·2
September	29·126	29·685	28·655	66·0	35·3	30·7	60·5	43·3	17·2	51·9	74·4	39·6	54·1	52·0
October... ...	29·576	30·051	29·114	63·6	28·0	35·6	57·0	41·8	15·2	49·4	73·4	58·3	51·9	48·2
November	29·505	29·780	28·813	56·9	27·0	29·9	49·3	37·0	12·3	43·1	58·0	33·6	45·1	43·6
December	29·284	29·938	28·786	55·6	25·2	30·4	48·5	35·7	12·8	42·1	51·2	31·7	43·9	42·9
Yearly Sums, Means, and Totals ...	29·342	29·881	28·732	66·1	29·6	36·4	55·5	39·8	15·7	47·7	76·6	36·1	50·0	47·1

CORK. Lat. 51° 53′ N.

January	29·418	30·302	28·782	54·5	28·5	26·0	48·3	37·0	11·3	42·6	56·8	...	43·7	41·5
February	29·345	29·993	28·628	55·2	21·8	33·4	47·5	33·9	13·6	40·7	67·0	...	41·8	39·4
March	29·303	30·230	28·325	60·9	21·5	39·4	49·3	34·4	14·9	41·8	76·0	...	44·1	41·6
April	29·468	29·969	29·012	66·0	31·2	34·8	54·7	40·4	14·3	47·5	86·8	37·8	49·9	47·0
May	29·779	29·941	29·224	70·0	29·2	40·8	60·3	41·5	18·8	50·9	98·3	39·7	53·6	49·1
June	29·551	29·839	29·053	80·0	41·6	38·4	66·3	49·4	16·9	57·8	100·1	41·0	60·6	56·4
July	29·610	29·985	28·926	82·4	42·0	40·4	71·2	51·0	20·2	61·1	100·3	49·5	64·9	58·9
August	29·428	29·763	29·055	76·2	41·2	35·0	66·6	48·9	17·7	57·7	99·7	50·7	60·7	55·9
September	29·487	29·776	28·747	69·7	28·7	41·0	63·5	42·6	20·9	53·0	97·2	47·5	56·3	52·6
October... ...	29·634	30·116	29·104	67·7	30·3	37·4	62·6	43·8	18·8	53·2	74·3	40·6	54·2	51·5
November	29·512	29·948	29·067	59·0	26·7	32·3	52·3	38·7	13·6	45·5	65·2	42·3	47·5	45·2
December	29·537	29·900	28·989	56·5	24·0	32·5	51·9	38·4	13·5	45·1	60·1	35·6	47·4	45·6
Yearly Sums, Means, and Totals ...	29·506	29·980	28·909	66·5	30·6	35·9	57·9	41·7	16·2	49·7	81·8	...	52·1	48·7

FORT REGENT, JERSEY. Lat. 49° 13′ N.

January	...	...	...	61·0	30·0	31·0	59·8	37·8	22·0	48·8	...	...	42·5	39·5
February	...	...	...	68·0	30·0	38·0	58·7	37·8	20·9	48·2	...	...	44·3	42·2
March	...	...	...	71·0	32·0	39·0	68·0	36·5	31·5	52·2	...	...	47·1	42·3
April	...	...	...	76·0	34·0	42·0	71·5	42·5	29·0	57·0	...	...	54·5	51·8
May	...	...	...	75·0	38·0	37·0	72·9	41·6	31·3	57·2	...	...	58·8	54·3
June	...	...	...	85·0	39·0	46·0	75·7	48·0	27·7	61·8	...	...	62·7	59·8
July	...	...	...	85·0	36·0	49·0	79·0	43·6	35·4	61·3	...	...	66·0	62·2
August... ...	...	...	...	82·0	40·0	42·0	74·4	48·8	25·6	61·6	...	...	64·4	60·6
September	...	...	...	72·0	40·0	32·0	65·5	49·5	16·0	57·5	...	...	60·2	56·5
October... ...	...	...	...	73·0	41·0	32·0	64·0	49·0	15·0	56·5	...	...	57·6	54·4
November	...	...	...	64·0	33·0	31·0	56·3	42·6	13·7	49·4	...	...	51·0	47·8
December	...	...	...	58·0	30·0	28·0	51·6	40·7	10·9	46·1	...	...	47·4	44·9
Yearly Sums, Means and Totals ...	...	...	...	72·5	35·2	37·2	66·4	43·2	23·2	54·8	...	...	54·7	51·4

No. XXXIV—*continued.*

Long. 4° 48′ 57″ W. Height above Sea 450 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.											
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	In a Cubic Foot of Air.			Mean Weight of Cubic Foot of Air.	Number of Days for mean Direction of Wind.				Number of calm, or nearly calm, Days.	Calculated from Robinson's Anemometer.		Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of days on which Rain fell.	Amount of Rain fall.	
		Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean degree of Humidity.		North.	East.	South.	West.		Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.				On the Ground.	20 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
39·0	·239	2·8	·3	91·7	540·6	2·00	1·00	14·50	13·50	0·00	...	...	6·4	3·8	18	2·58	1·36
35·6	·209	2·4	·4	88·0	541·8	5·25	1·50	12·00	9·25	0·00	...	...	5·6	3·2	19	2·93	2·48
33·7	·194	2·2	·8	74·8	539·7	9·75	6·00	7·75	7·50	0·00	...	354·7	6·7	3·8	16	2·70	2·13
41·7	·265	3·0	·9	77·5	536·2	5·50	10·50	9·00	5·00	0·00	...	348·3	6·1	3·7	15	1·85	1·38
42·6	·272	3·0	1·5	67·0	532·3	6·00	6·25	10·25	8·50	0·00	...	292·0	5·2	3·7	7	1·23	1·09
51·7	·384	4·3	1·3	76·7	523·9	5·00	4·50	12·00	8·50	0·00	...	302·4	6·6	3·3	19	3·37	2·94
54·7	·430	4·8	1·7	73·9	520·6	8·75	4·75	6·75	10·75	0·00	...	248·8	5·9	2·7	11	1·41	1·23
51·9	·387	4·3	1·3	77·7	522·0	7·25	3·00	9·00	11·75	0·00	...	416·6	4·7	4·0	23	2·21	1·80
50·0	·359	4·1	·6	85·4	524·2	4·25	2·50	12·25	11·00	0·00	...	383·4	5·1	3·9	24	3·88	3·27
44·5	·294	3·4	1·0	75.8	535·1	6·75	8·75	10·75	4·75	0·00	...	306·2	7·2	2·7	12	1·77	1·43
41·8	·265	3·0	·4	88·6	541·2	7·00	0·25	8·00	14·75	0·00	...	387·1	6·8	3·8	14	1·71	1·46
41·7	·265	3·1	·2	92·0	538·3	2·75	1·00	13·00	14·25	0·00	...	403·0	6·9	3·6	21	2·78	2·27
44.1	·297	3·4	0·9	80·8	524·7	70·25	50·00	125·25	119·50	0·00	...	...	6·1	3·5	199	28·32	22·84

Long. 8° 20′ W. Height above Sea 257 feet.

39·0	·237	2·7	·5	83·1	541·2	7·00	1·25	9·00	12·25	1·50	...	...	7·8	...	26	5·08	*
36·4	·216	2·5	·6	82·4	542·0	10·75	2·75	4·50	10·00	0·00	...	...	5·6	...	21	2·62	...
38·6	·235	2·7	·6	80·6	538·8	10·50	3·50	7·50	4·50	0·00	...	237·2	7·5	2·8	18	4·52	3·18
43·9	·287	3·3	·8	80·6	535·2	6·50	9·75	8·50	5·25	0·00	...	166·6	7·7	2·9	25	3·21	2·80
44·7	·295	3·4	1·2	71·6	536·9	6·50	8·25	11·25	5·00	0·00	...	165·6	5·8	2·5	14	1·58	1·46
52·7	·399	4·5	1·5	75·4	525·0	6·50	6·00	11·75	5·75	0·00	...	169·6	7·6	2·0	20	5·41	4·08
53·9	·417	4·6	2·2	67·9	521·8	9·25	8·00	7·25	6·50	0·00	...	148·6	7·0	2·0	17	0·68	0·63
51·7	·384	4·3	1·6	72·0	522·8	8·00	4·25	9·75	9·00	0·00	...	218·5	5·5	2·5	26	3·88	3·12
49·2	·351	3·9	1·1	77·1	528·5	7·00	3·00	9·50	10·50	0·00	...	233·6	5·5	3·2	19	3·06	2·77
48·8	·345	3·9	·8	81·8	533·3	5·50	12·00	10·25	3·25	0·00	...	141·7	6·5	2·0	16	2·91	2·76
42·7	·273	3·1	·6	84·4	538·6	10·00	3·00	7·75	9·25	0·00	...	196·1	6·0	2·6	25	1·59	1·44
43·6	·284	3·2	·5	87·8	539·1	6·00	2·75	13·25	9·00	0·00	...	220·8	6·9	2·6	25	5·32	5·05
45·4	·310	3·5	1·0	78·7	533·6	93·50	69·50	100·25	90·25	1·50	...	...	6·6	...	262	39·86	...

* 25 feet above the ground.

Long. 2° 16′ W. Height above Sea 72 feet.

35·9	·211	2·5	·7	78·0	...	1·50	4·00	12·50	10·00	3·00	...	...	...	4·1	18	5·60	...
39·7	·245	2·8	·5	83·8	...	3·50	3·50	9·50	11·50	0·00	...	...	...	5·2	19	2·90	...
36·9	·219	2·5	1·2	68·3	...	9·00	6·00	8·50	7·50	0·00	...	...	...	5·6	12	1·96	...
49·2	·350	4·0	·8	91·8	...	4·00	9·00	6·50	7·50	3·00	...	...	...	6·0	9	1·02	...
50·3	·365	4·1	1·4	73·5	...	3·00	16·00	6·00	5·00	1·00	...	...	...	5·9	10	1·10	...
57·3	·472	5·2	1·1	83·3	...	4·00	5·25	14·50	4·75	1·50	...	...	...	5·9	7	1·69	...
59·2	·503	5·6	1·4	79·0	...	0·75	7·75	9·00	12·50	1·00	...	...	...	4·7	8	1·42	...
57·5	·474	5·2	1·5	78·0	...	2·00	3·00	7·75	18·25	0·00	...	...	...	5·3	17	3·09	...
53·3	·407	4·5	1·4	78·0	...	1·75	1·75	9·00	17·50	0·00	...	...	...	5·1	28	6·79	...
51·5	·381	4·3	1·1	80·4	...	5·25	10·00	8·75	5·50	1·50	...	...	...	2·2	10	1·01	...
44·5	·294	3·3	·9	78·8	...	7·50	1·75	3·75	16·00	1·00	...	...	...	4·9	20	2·03	...
42·2	·269	3·1	·6	82·9	...	5·50	3·25	9·00	12·25	1·00	...	...	...	6·2	19	2·88	...
48·1	·349	3·9	1·0	78·8	...	47·75	71·25	104·75	128·25	13·00	...	...	...	5·1	177	31·49	...

* 25 feet above the ground.

Appendix

FORT GEORGE, GUERNSEY. Lat. 49° 33′ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Mean				Maximum in Sun's rays.	Minimum on Grass.	Hygrometer.	
							Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.			Dry Bulb.	Wet Bulb.
January	29·691	30·441	28·139	53·5	32·0	21.5	50·6	40·5	10·1	45·5	59·3	35·4	47·1	45·0
February	29·534	30·050	28·750	54·0	32·0	22·0	49·4	38·4	11·0	43·9	72·7	36·3	45·8	43·6
March	29·436	30·155	28·768	57·5	31·0	26·5	48·6	37·4	11·2	43·0	80·0	34·5	44·4	41·9
April	29·624	30·105	29·156	68·0	34·0	34·0	56·7	42·4	14·3	49·6	94·7	39·0	51·4	49·1
May	29·713	30·115	29·198	66·5	35·0	31·5	59·3	42·8	16·5	51·1	104·7	39·9	53·8	50·6
June	29·714	30·017	29·310	79·0	41·5	37·5	68·2	50·5	17·7	59·3	110·6	48·7	61·1	58·4
July	29·735	30·145	29·209	82·0	47·0	35·0	69·0	52·1	16·9	60·5	108·2	50·6	62·3	59·6
August	29·628	29·966	29·226	75·0	46·5	28·5	67·9	52·5	15·4	60·2	105·6	51·1	62·2	59·2
September ...	29·559	29·806	29·048	69·0	45·0	24·0	63·9	50·1	13·8	57·0	96·4	48·8	59·0	56·4
October... ...	29·811	30·223	29·450	68·0	42·5	25·5	60·9	49·5	11·4	55·2	91·8	47·4	56·6	54·3
November ...	29·786	30·095	29·273	59·5	35·5	24·0	53.8	43·6	10·2	48·7	74·8	41·4	50·4	47·8
December ...	29·780	30·225	29·042	57·5	30·0	27·5	51·9	41·5	10·4	46·7	67·6	39·9	48·4	46·7
Yearly Sums, Means, and Totals ...	29·667	30·119	29·047	65·8	37·7	28·1	58·3	45·1	13·2	51·7	88·9	42·7	53·5	51·0

No. XXXIV—*continued.*

Long. 2° 40′ W. Height above Sea 248 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.											
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	In a Cubic Foot of Air.			Mean Weight of Cubic Foot of Air.	Number of Days for mean Direction of Wind.				Number of calm, or nearly calm, Days.	Calculated from Robinson's Anemometer.		Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of days on which Rain fell.	Amount of Rain fall.	
		Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean degree of Humidity.		North.	East.	South.	West.		Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.				On the Ground.	25 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
42·7	·274	3·2	·5	85·4	542·5	5·25	2·75	8·75	13·25	1·00	...	516·2	7·8	4·5	25	5·63	5·07
41·1	·259	2·9	·6	84·4	541·0	4·75	4·00	5·25	14·00	0·00	...	552·2	7·9	4·7	24	4·19	3·95
38·9	·238	2·7	·6	80·9	540·9	9·00	7·00	7·00	7·50	0·50	...	503·8	7·9	4·5	20	1·82	1·67
46·8	·321	3·6	·7	84·3	536·4	3·00	10·00	6·00	10·00	1·00	...	382·8	6·3	6·1	19	1·55	1·42
47·5	·327	3·7	1·0	78·8	535·4	7·25	12·25	2·50	6·50	2·50	...	391·1	4·0	6·2	15	1·84	1·70
56·1	·450	5·0	1·0	83·9	527·0	4·25	3·75	6·75	10·75	4·50	...	301·2	5·7	5·9	14	1·46	1·37
57·3	·471	5·2	1·0	84·1	526·0	5·75	8·50	1·25	13·00	2·50	...	353·7	6·2	6·1	12	1·74	1·64
56·6	·460	5·1	1·1	82·2	524·3	5·25	1·00	5·50	17·75	1·50	...	392·1	6·3	5·3	18	3·11	2·96
54·0	·418	4·7	·9	84·4	526·5	3·25	1·25	8·00	15·00	2·50	...	429·2	7·6	5·1	27	7·28	6·96
52·2	·391	4·4	·7	85·2	533·8	6·25	13·25	7·25	3·25	1·00	...	314·2	6·2	5·4	9	0·88	0·80
45·1	·300	3·4	·7	82·4	540·3	9·75	2·00	6·00	11·75	0·50	...	438·5	7·5	5·1	19	2·01	1·87
44·8	·298	3·4	·5	88·1	542·4	5·75	2·50	7·25	12·50	3·00	...	446·8	8·5	5·3	21	2·74	2·59
48·6	·351	3·9	0·8	83·7	534·7	69·50	68·25	71·50	135·25	20·50	...	418·5	6·8	5·3	223	34·23	32·00

APPENDIX

Abstract of Results of Meteorological Observations

GIBRALTAR. Lat. 36° 6′ 20″ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
							Mean						Hygrometer.	
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.	Maximum in Sun's rays.	Minimum on Grass.	Dry Bulb.	Wet Bulb.
January	30·212	30·437	29·675	64·0	49·0	24·0	60·4	48·1	12·3	54·2	77·6	...	56·2	52·5
February	30·064	30·508	29·373	68·0	44·0	24·0	63·5	49·5	14·0	56·5	97·7	...	58·0	54·6
March	29·887	30·288	29·408	72·0	40·0	32·0	62·2	47·3	14·9	54·7	99·7	...	57·2	53·5
April	29·968	30·322	29·580	74·0	45·0	29·0	66·6	53·0	13·6	59·8	108·8	...	62·4	58·4
May	29·950	30·153	29·698	80·0	49·0	31·0	72·6	57·3	15·3	64·9	116·7	55·4	67·3	62·5
June	29·933	30·271	29·746	87·0	53·0	34·0	78·2	60·5	17·7	69.3	128·5	58·2	71·9	66·0
July	30·010	30·223	29·855	87·0	61·0	26·0	82·1	65·3	16·8	73·7	131·8	62·8	75·9	68·9
August	29·974	30·095	29·809	90·0	57·0	33·0	84·2	63·1	21·1	73·6	138·7	62·5	77·5	70·0
September ...	30·016	30·217	29·833	89·0	50·0	39·0	79·2	54·9	24·3	67·5	123·9	58·3	74·0	67·5
October... ...	30·023	30·224	29·809	74·0	50·0	24·0	70·2	52·9	17·3	61·5	96·4	56·3	66·5	62·4
November ...	30·103	30·262	29·833	72·0	49·0	23·0	68·3	56·3	12·0	62·3	93·8	50·6	63·8	59·9
December ...	30·204	30·415	29·655	69·0	48·0	21·0	64·7	55·9	8·8	60·3	86·7	46·6	61·1	58·0
Yearly Sums, Means, and Totals ...	30·033	30·284	29·693	77·2	48·8	28·3	71·0	55·3	15·7	63·2	108·3	...	66·0	61·2

MALTA. Lat. 30° 53′ 54″ N.

January	30·003	30·204	29·696	66·2	49·7	16·5	60·4	53·0	7·4	56·7	114·7	46·6	58·0	52·2
February	29·986	30·133	29·418	68·6	49·3	19·3	63·3	54·2	9·1	58·7	121·2	47·7	60·4	55·5
March	29·729	29·971	29·326	77·0	49·5	27·5	66·7	56·3	10·4	61·5	127·6	50·5	63·5	57·7
April	29·878	30·031	29·550	75·7	49·8	25·9	68·2	58·0	10·2	63·1	127·9	52·3	65·1	59·1
May	29·793	29·945	29·374	80·6	58·0	22·6	71·4	62·0	9·4	66·7	129·0	56·5	68·5	62·6
June	29·827	29·969	29·269	88·5	61·3	27·2	79·2	67·9	11·3	73·5	134·4	62·9	75·6	68·4
July	29·764	29 974	29·645	93·6	69·6	24·0	85·6	73·5	12·1	79·5	140·0	67·8	80·7	72·0
August	29·808	29·907	29·547	93·1	68·9	24·2	84·1	72·7	11·4	78·4	140·6	66·8	80·6	73·3
September ...	29·841	29·975	29·546	88·8	66·9	21·9	81·3	71·6	9·7	76·4	137·1	65·4	78·3	71·0
October... ...	29·906	30·064	29·510	85·9	55·6	30·3	75·4	66·1	9·3	70·7	130·8	60·7	72·3	65·2
November ...	29·886	30·125	29·349	74·1	51·3	22·8	68·2	60·0	8·2	64·1	121·6	56·1	61·0	59·5
December ...	29·975	30·297	29·588	69·4	51·2	18·2	64·1	55·4	8·7	59·7	119·7	48·3	61·4	56·3
Yearly Sums, Means, and Totals ...	29·866	30·057	29·484	80·1	56·7	23·3	72·3	62·5	9·7	67·4	128·7	56·8	68·7	62·7

QUEBEC. Lat. 46° 48′ N.

January	29·863	30·913	29·201	35·0	−28·8	63·8	21·8	−3·6	25·4	9·1	26·3	...	9·5	9·4
February	29·805	30·467	29·146	46·0	−18·2	64·2	26·6	4·2	22·4	15·4	32·3	...	16·7	16·4
March	29·661	30·212	29·129	59·0	− 6·0	65·0	33·0	21·8	21·2	27·4	51·7	...	28·9	23·4
April	29·661	30·162	28·740	70·0	17·6	52·4	55·7	30·1	25·6	42·9	82·3	...	42·7	39·7
May	29·477	29·859	29·090	79·0	29·0	50·0	62·6	37·0	25·6	49·8	93·0	33·2	50·3	45·4
June	29·617	30·060	29·288	94·5	33·5	61·0	75·1	50 3	24·8	62·7	111·5	45·7	64·1	57·8
July	29·651	29·949	29·438	93·5	49·0	44·5	85·8	58·4	27·4	72·1	121·4	56·6	73·7	66·1
August	29·593	29·926	29·327	88·0	43·0	45·0	73·3	52·0	21·3	62·6	105·2	51·5	63·5	59·4
September ...	29·706	30·124	29·337	81·5	32·0	49·5	69·6	45·2	24·4	57·4	92·6	45·0	57·6	53·6
October... ...	29·896	30·236	29·210	83·0	20·0	63·0	56·8	33·4	23·4	45·1	74·4	33·1	44·6	40·8
November ...	29·702	30·181	29·185	68·5	17·0	51·5	41·6	27·0	14·6	34·3	46·4	27 5	33·9	33·5
December ...	29·733	30·374	28·690	44·5	−14·0	58·5	29·8	11·0	18·8	20·4	31·9	12·1	21·6	20·8
Yearly Sums, Means, and Totals ...	29·696	30·205	29·148	70·2	14·5	55·7	52·6	29·7	22·9	41·0	72·4	...	42·0	38·9

No. XXXV.

taken at Foreign Stations in the Year 1866.

Long. 5° 20′ 53″ W. Height above Sea 50 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.											
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	In a Cubic Foot of Air.			Mean Weight of Cubic Foot of Air.	Number of Days for mean Direction of Wind.				Number of calm, or nearly calm Days.	Calculated from Robinson's Anemometer.		Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	Amount of Rain fall.	
		Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.		North.	East.	South.	West.		Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.				On the Ground.	25 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
49·1	·350	3·9	1·1	77·0	541·7	6·50	14·50	3·00	7·00	0·00	...	282·5	6·0	2·7	5	0·89	0·85
51·5	·382	4·3	1·1	79·8	536·9	5·00	8·00	3·00	12·00	0·00	...	335·7	4·7	3·1	7	4·21	3·81
50·1	·362	4·0	1·2	77·0	534 6	2·50	9·25	5·50	13·75	0·00	...	396·1	5·3	3·9	16	10·85	10·06
55·0	·433	4·8	1·5	77·0	530·2	2·50	14·25	5·00	8·25	0·00	...	307·5	5·9	3·1	9	1·57	1·35
58·7	·496	5·4	2·0	74·0	524·2	2·25	12·50	5·75	10·50	0·00	...	275·2	4·8	2·9	6	3·39	3·08
61·5	·549	5·9	2·6	69·4	520·4	2·50	8·50	6·00	13·00	0·00	...	271·8	4·2	2·4	3	1·60	1·49
63·9	·595	6·4	3·2	66·0	516·6	2·75	14·25	2·75	11·25	0·00	...	301·6	2·7	3·6	0	0·00	0·00
64·8	·613	6·6	3 5	65·0	514·5	3·25	18·00	3·50	*6·25	0·00	...	739·4	2·2	3·5	1	0·15	0·15
62·7	·571	6·2	2·9	68·0	518·8	5·00	15·25	4·50	5·25	0·00	...	857·7	5·9	3·8	5	1·52	1·23
59·1	·502	5 5	1·6	77·5	526·8	4·50	15·75	3·25	7·50	0 00	...	...	4·8	2·9	2	1·15	1·02
56·7	·461	5·1	1·5	78·3	531·1	5·75	15·25	2·00	7·00	0·00	...	...	4·3	3·3	0	0·00	0·00
55·3	·436	4·9	1·1	81·5	535·7	4·75	16·50	3·75	6·00	0·00	...	...	4·9	3·5	3	1·05	0·91
57·4	·479	5·2	1·9	74·2	527·7	47·25	162·00	48·00	107·75	0·00	...	...	4·6	3·2	57	26·39	23·95

Long. 14° 30′ 30″ E. Height above Sea 111 feet.

47·0	·322	3·6	1·8	67·0	536·3	10·75	8·75	2·25	6·75	2·50	...	154·6	5·4	4·2	7	0·63	0·57
51·2	·378	4·2	1·7	71·9	533·0	5·50	6·50	5·00	8·00	3·00	...	141·2	4·3	3·9	5	2·25	2·21
52·9	·400	4·5	2·0	68·5	525·3	8·75	4·25	5·00	12·50	0·50	...	137·2	4·6	4·4	5	0·48	0·43
54·2	·420	4·6	2·2	68·1	526·0	9·75	10·25	6·00	4·00	0·00	...	145·0	4·5	4·9	2	0·11	0·10
57·9	·483	5·3	2·3	68·5	520·9	11·75	12·50	2·50	3·75	0·50	...	120·6	4·2	5·0	7	0·60	0·58
63·2	·581	6·3	3·3	65·2	513·8	12·25	8·75	2·50	4·00	2·50	...	69·7	3·4	5·2	3	0·22	0·22
66·1	·641	6·9	4·3	60·9	507·6	15·75	4·25	0·25	10·25	0·50	...	110·0	2·0	4·6	0	0·00	0·00
68·3	·693	7·4	3·8	65·8	508·1	12·00	6·25	2·25	8·00	2·50	...	83·6	3·3	4·6	1	0·09	0·09
65·9	·638	6·8	3·5	66·1	511·3	8·50	7·75	5·00	7·25	1·50	...	100·6	3·3	4·1	3	0·10	0·10
59·8	·517	5·6	3·0	64·6	518·9	3·75	11·75	4·50	5·50	0·50	...	100·1	7·0	4·3	15	3·12	3·09
58·2	·486	5·4	·6	91·0	529·9	9·75	4·00	3·50	8·25	4·50	...	109·2	5·8	4·1	11	2·29	2·23
51·9	·386	4·3	1·8	71·5	531·7	9·25	4·25	2·00	8·50	7·00	...	104·7	5·0	3·6	8	0·65	0·61
58·0	·495	5·4	2·5	69·1	521·9	122·75	89·25	40·75	86·75	25·50	...	114·7	4·4	4·4	67	10·54	10·23

Long. 71° 12′ W. Height above Sea 320 feet.

8·5	·063	·8	·0	96·0	591·4	†	†	†	†	0·00	...	...	5·7	0·5	1	...	...
14·2	·082	1·0	·1	89·0	580·6	7·50	10·75	1·75	8·00	0·00	...	...	7·0	0·9	2	...	...
20·5	·110	1·3	·2	87·0	569·0	6·50	11·00	3·00	10·50	0·00	...	...	7·4	0·3	1	...	...
36·0	·212	2·4	·7	78·0	546·9	6·00	12·25	4·25	7·50	0·00	...	...	6·5	0·4	9	2·39	...
40·2	·250	2·8	1·3	68·9	535·3	10·25	6·75	3·75	10·25	0·00	...	...	6·6	1·8	14	5·10	...
52·5	·396	4·4	2·2	65·8	522·8	7·50	8·25	4·75	9·50	0 00	...	...	6·1	1·3	14	4·59	...
60·5	·528	5·7	3·3	63·6	513·2	9·50	6·75	2·25	12·50	0·00	...	...	5·4	0·7	12	4·66	...
55·9	·449	5·0	1·5	77·0	522·6	6·50	6·00	4·50	14·00	0·00	...	132·5	6·8	2·8	10	5·52	...
49·9	·360	4·0	1·3	75·6	531·0	6·25	6·50	7·50	9·75	0·00	...	103·5	7·0	1·3	15	6·59	...
36·4	·215	2·5	·8	72·8	549 2	6·25	8·25	3·25	7·25	0·00	...	149·8	5·3	1·3	3	1·87	...
32·7	*186	2·2	·1	96·0	557·7	5·00	10·75	3·50	10·75	0·00	...	138·0	8·4	0·4	6	2·87	...
15·5	·088	1·1	·3	76·8	573·2	7·75	4·50	3·75	15·00	0·00	...	149·6	7·8	0·6	3	0·24	...
35·2	·245	2·8	1·0	78·9	549·4	86·25	99·00	46·50	127·25	0·00	...	...	6·7	1·0	90	...	...

* 26 feet above the ground. † Six days in October not taken.

St. John's, Newfoundland. Lat. 47° 35′ N.

Months.	Readings of the Barometer. Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Temperature of the Air. Highest during Month.	Lowest during Month.	Range during Month.	Mean of all the highest.	Mean of all the lowest.	Mean Daily Range.	Mean Approximate Temperature.	Mean Daily Readings of Maximum in Sun's rays.	Minimum on Grass.	Hygrometer. Dry Bulb.	Hygrometer. Wet Bulb.
	*	*	*											
January	29·684	30·389	28·664	42·8	−4·8	47·6	29·1	11·0	18·1	20·0	...	9·8	23·0	22·2
February	29·974	30·629	28·956	35·2	−4·0	59·2	34·1	15·8	18·3	24·9	...	14·6	27·6	26·4
March	29·851	30·493	29·038	46·0	2·0	44·0	35·9	19·0	16·9	27·4	...	18·2	30·5	29·5
April	29·663	30·269	29·175	59·4	15·4	44·0	44·5	24·4	20·1	34·4	...	22·4	37·5	35·6
May	29·667	30·038	29·151	78·9	23·0	55·0	53·8	31·8	22·0	42·8	...	30·0	46·5	45·3
June	29·784	30·143	29·351	82·7	26·7	56·0	64·7	40·7	24·0	52·7	...	38·6	55·9	54·2
July	29·796	30·138	29·326	85·7	34·0	51·7	71·8	50·2	21·6	61·0	...	49·2	64·6	60·4
August	29·445	30·047	29·056	82·0	40·0	42·0	69·6	48·2	21·4	58·9	...	45·0	61·1	57·5
September	29·987	30·465	28·506	75·0	26·5	48·5	66·6	44·6	22·0	55·6	...	41·2	58·4	52·3
October... ...	29·776	30·482	29·338	69·5	16·0	53·5	55·4	35·6	19·8	45·5	...	32·7	45·2	42·8
November	29·653	30·182	28·969	68·0	15·4	52·6	45·5	26·4	19·1	36·0	...	25·3	37·7	36·2
December	29·675	30·246	28·955	65·0	5·4	59·6	43·8	22·3	21·5	33·0	...	24·1	32·5	31·0
Yearly Sums, Means, Totals ...	29·730	30·298	29·040	67·4	16·3	51·1	51·2	30·8	20·4	41·0	...	29·3	43·4	41·1

St. Anne's, Barbados. Lat. 13° 4′ 37″ N.

January	30·011	30·100	29·894	88·0	68·0	20·0	85·3	71·0	14·3	78·1	132·0	66·3	80·9	73·6
February	30·012	30·142	29·883	87·5	64·0	23·5	85·0	69·6	15·4	77·3	135·3	64·2	80·5	71·5
March	29·995	30·113	29·902	89·0	62·0	27·0	86·6	72·0	14·6	79·3	147·0	63·9	81·6	71·6
April	29·993	30·085	29·875	90·5	69·5	21·0	88·0	72·7	15·3	80·3	151·0	66·4	83·5	72·8
May	29·967	30·054	29·854	91·0	71·0	20·0	88·3	73·7	14·6	81·0	152·2	69·3	84·2	75·0
June	30·017	30·118	29·886	91·0	73·0	18·0	89·2	75·0	14·2	82·1	153·5	70·6	84·6	75·9
July	30·000	30·095	29·900	90·0	71·5	18·5	87·9	73·7	14·2	80·8	143·0	70·5	83·8	76·4
August	29·950	30·026	29·864	90·0	69·0	21·0	88·2	73·6	14·6	80·9	141·9	70·1	83·6	77·1
September	29·962	30·073	29·898	92·0	70·5	21·5	89·1	73·7	15·4	81·4	146·2	69·8	85·6	77·9
October... ...	29·919	30·063	29·823	92·0	69·8	22·2	88·3	73·7	14·6	81·0	138·0	69·7	84·2	77·7
November	29·899	30·000	29·817	90·5	67·5	23·0	87·5	72·5	15·0	80·0	137·0	68·3	83·6	77·2
December	29·917	30·096	29·849	88·0	69·0	19·0	86·1	72·4	13·6	79·2	131·2	66·9	81·9	74·6
Yearly Sums, Means, and Totals ...	29·970	30·080	29·870	90·0	68·7	21·2	87·5	72·8	14·6	80·1	142·4	68·0	83·9	75·1

Bermuda. Lat. 32° 27 N.

January	30·095	30·404	29·651	76·0	41·0	35·0	70·3	56·5	13·8	63·4	85·9	50·1	65·5	60·8
February	30·186	30·463	29·786	74·0	46·5	27·5	69·2	57·0	12·2	63·1	82·7	54·3	65·6	61·2
March	30·008	30·335	29·631	75·3	43·0	32·3	68·3	53·1	15·2	60·7	85·3	49·2	63·7	57·9
April	30·072	30·228	29·658	76·0	54·2	21·8	72·4	58·4	14·0	65·4	92·1	54·3	68·8	62·3
May	29·923	30·171	29·632	83·0	55·2	27·8	76·3	62·9	13·4	69·6	97·3	60·4	77·8	67·7
June	30·126	30·263	29·722	87·7	61·0	26·7	82·7	68·6	14·1	75·6	108·7	65·3	79·4	71·5
July	30·066	30·224	29·880	90·1	67·0	23·1	85·4	72·1	13·3	78·7	113·0	69·7	82·1	76·0
August	30·008	30·129	29·873	90·0	67·0	23·0	85·8	71·4	14·4	78·6	109·7	67·9	82·2	75·3
September	30·028	30·089	29·793	89·0	66·0	23·0	86·6	71·8	14·8	79·2	109·1	67·8	83·4	75·2
October... ...	29·933	30·280	29·283	90·5	56·6	34·5	80·0	65·5	14·5	72·7	100·2	61·1	76·2	68·9
November	29·980	30·259	29·569	80·0	53·5	26·5	74·7	60·0	14·7	67·3	91·8	54·1	70·2	64·0
December	30·053	30·283	29·787	77·0	45·0	32·0	70·1	56·4	13·7	63·2	88·4	52·5	66·5	60·2
Yearly Sums, Means, and Totals ...	30·040	30·269	29·689	82·4	54·6	27·8	76·8	62·8	14·0	69·8	96·9	58·9	73·4	66·7

* Barron and Co.

No. XXXV—*continued.*

Long. 52° 42′ W. Height above Sea 130 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.											
		In a Cubic Foot of Air.				Number of Days for mean Direction of Wind.					Calculated from Robinson's Anemometer.					Amount of Rain fall	
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.	Mean Weight of Cubic Foot of Air.	North.	East.	South.	West.	Number of calm, or nearly calm, Days.	Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.	Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	On the Ground.	20 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
17·2	·094	1·1	·4	77·0	570·6	6·75	3·25	4·50	12·00	4·50	...	249·8	8·0	4·0	3	1·40	1·23
21·3	·115	1·4	·4	77·0	570·6	4·75	0·75	10·25	11·25	1·00	...	358·7	7·0	3·0	5	0·60	0·54
26·7	·144	1·7	·3	85·0	561·0	9·00	4·50	8·50	8·50	0·50	...	284·2	7·5	2·5	6	1·70	1·51
33·0	·188	2·2	·5	84·3	552·8	6·75	5·00	6·75	10·00	1·50	...	179·9	7·0	5·0	7	3·35	2·87
44·0	·288	3·3	·3	91·6	542·4	2·75	7·25	12·50	8·25	0·25	...	201·6	7·0	5·1	14	4·19	3·22
52·6	·398	4·5	·5	89·0	533·9	7·25	3·00	9·25	10·00	0·50	...	180·7	6·0	4·5	8	1·18	9·74
56·9	·465	5·1	1·6	76·0	524·9	5·00	4·50	9·75	11·75	0·00	...	165·5	6·5	4·5	11	5·27	4·17
54·3	·423	4·7	1·3	79·0	522·4	5·75	8·25	6·50	10·00	0·50	...	241·8	5·5	4 5	9	7·95	...
46·8	·321	3·6	1 8	65·9	535·4	3·75	2·00	4 00	17·25	3·00	...	281·3	5·6	4·7	11	3·39	3·09
40·0	·247	2·8	·6	82·4	546·1	13·75	1·25	6·75	8·75	0·50	...	259·2	7·5	5·0	13	6·46	5·75
34·2	·197	2·3	·4	87·2	552·3	8·25	2·00	6·25	10·00	3·50	...	227·2	9·0	4·0	9	5·74	...
27·9	·152	1·8	·3	83·0	559·0	5·50	1·50	7·25	13·75	3·00	...	247·1	9·0	5·0	5	2·64	...
37·9	·253	2·9	0·7	81·4	547·6	79·25	43·25	92·25	131·50	18·75	...	239·6	7·1	4·3	101	43·87	...

Long. 59° 40′ 8″ W. Height above Sea 15 feet.

																	*
68·7	·702	7·4	3·8	65·8	511·3	13·50	16·75	0·75	0·00	0·00	...	...	4·2	...	18	2·59	2·24
65·4	·625	6·7	4·4	59·5	512·2	13·75	13·75	0·50	0·00	0·00	...	...	4·3	...	19	2·63	2·39
64·8	·615	6·6	4·9	56·6	510·8	13·50	16·25	1·25	0·00	0·00	...	...	4·1	...	11	1·34	1·22
65·7	·633	6·7	5·5	54·9	508·9	12·00	16·50	1·50	0·00	0·00	...	...	3·3	...	11	0·65	0·58
69·0	·708	7·5	4·8	59·4	507·3	11·00	17·25	2·75	0·00	0·00	...	...	3·4	...	16	3·97	3·39
70·1	·739	7·9	4·8	61·8	507·8	12·75	16·75	0·50	0·00	0·00	...	...	3·5	...	12	2·78	2·57
71·5	·772	8·2	4·1	66·4	508·0	13·25	16·50	1·25	0·00	0·00	...	...	4·3	...	26	6·52	5·97
72·8	·805	8·5	3·7	70·0	507·2	13·00	16·50	1·50	0·00	0·00	...	...	4·5	...	23	13·01	12·10
72·9	·811	8·5	4·5	65·8	505·4	9·00	18·75	2·25	0·00	0·00	...	...	2 9	...	14	2·16	1·99
73·4	·824	8·7	3·7	70 0	505·8	10·00	19·25	1·75	0·00	0·00	...	...	4·2	...	22	6·64	6·11
73·0	·809	8·6	3·6	70·4	506 0	11·25	16·75	2·00	0·00	0·00	...	...	3·7	...	19	3·42	3·16
69·7	·727	7·8	3·8	66·8	508·5	15·00	15·75	0·25	0 00	0·00	...	...	4·3	....	18	4·42	4·05
69·7	·731	7·8	4·3	63·9	508·3	148 00	200·75	16·25	0·00	0·00	...	...	3·9	...	209	50·13	46·17

Long. 62° 40′ W. Height above Sea 61 feet.

																	†
56·9	·465	5·1	1·7	74·5	529·2	8·00	2·00	8·50	10·50	2·00	...	125·6	7·9	2·5	19	2·01	1·66
57·6	·478	5·3	1·0	76·5	530·8	3·50	6·00	7·50	8·00	3·00	...	268·5	7·9	2·7	17	4·13	2·49
53·1	·404	4·5	2·0	68·7	530·1	7·50	4·50	4·50	12·50	2·00	...	240·9	6 8	3·1	25	3·12	1·61
57·2	·469	5·2	2·5	65·5	525·5	7·50	5·00	5 50	8·00	4·00	...	237·5	6 1	2·0	8	1·99	1·34
60·6	·532	5·7	4·5	55·7	513·8	4·00	7·00	7·00	11·00	2·00	...	296·9	8·0	3·4	15	5·93	4·07
66·1	·641	6·9	3·8	63·8	515·0	16·00	2·00	7·00	7·00	4 00	...	228·9	7·9	3·2	8	1·03	0·73
71·9	·783	8·4	3·3	71·6	510·5	7·50	8·25	6·75	7·50	1·00	...	302·9	7·8	3·8	17	3·46	1·88
70·7	·751	8·0	3·8	68·4	509·7	4·50	4·00	11·50	5·00	6·00	...	230·8	6·9	3·9	15	5·77	2·40
69·8	·727	7·7	4·4	63·6	508·9	6·50	4·50	12·75	5·25	1·00	...	154·8	5·9	4·1	10	3·45	2·13
63·7	·590	6·3	3·4	66·0	515·2	5·00	7·50	15·50	4·50	0·50	...	257·3	7·7	4·3	14	2·70	1·35
59·3	·505	5·5	2·6	68·2	522·4	5·75	8·25	14 50	1·50	0·00	...	184·2	6·7	2·7	16	7·30	5·04
55·1	·435	4·8	2·3	67·0	527·7	6·25	7·75	13·00	3·25	0·75	...	241 8	8 0	4·2	15	4·20	2·30
61·8	·565	6·1	3·0	67·5	519·9	72·00	66·75	142·00	81·00	26·25	...	252 5	7·3	3 3	179	43·09	26·40

* 30 feet above the ground. † 20 feet above the ground. ‡ 4 days in June not taken.

Appendix

UP PARK CAMP, JAMAICA. Lat. 17° 59′ N.

Month.	Readings of the Barometer. Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Temperature of the Air. Highest during Month.	Lowest during Month.	Range during Month.	Mean. Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.	Mean Daily Readings of Maximum in Sun's rays.	Minimum on Grass.	Hygrometer. Dry Bulb.	Wet Bulb.
January	29·749	29·881	29·677	91·2	62·2	29·0	86·2	68·0	18·2	77·1	...	54·1	83·9	72·7
February	29·727	29·935	29·70	92·2	65·0	27·2	85·7	68·2	17·5	76·9	...	52·4	84·4	74·6
March	29·750	29·895	29·657	88·2	65·0	23·0	84·0	67·0	17·0	75·5	...	50·5	82·9	73·9
April	29·703	29·843	29·625	88·2	66·0	22·2	84·0	69·3	14·7	76·6	...	53·5	82·3	74·7
May	29·661	29·814	29·616	89·2	64·2	25·0	85·8	71·1	14·7	78·4	...	57·2	86·1	78·9
June	29·693	29·851	29·690	91·0	71·0	20·0	88·3	73·3	15·0	80·8	...	62·9	87·3	76·9
July	29·693	29·831	29·666	92·0	71·0	21·0	89·4	73·9	15·5	81·6	...	63·3	88·6	76·7
August	29·686	29·804	29·658	90·0	72·0	18·0	89·4	73·3	16·1	81·3	...	63·2	89·3	77·0
September	29·588	29·836	29·546	93·0	71·0	22·0	89·2	73·5	15·7	81·3	...	64·8	87·4	79·1
October	29·559	29·732	29·556	94·0	72·0	22·0	89·0	73·3	15·7	81·1	...	65·4	85·0	76·6
November	29·605	29·836	29·583	91·0	68·0	23·0	87·5	70·3	17·2	78·9	...	61·7	83·9	75·1
December	29·707	29·895	29·659	93·0	67·0	26·0	88·5	68·8	19·7	78·6	...	59·0	85·1	73·9
Yearly Sums, Means, and Totals ...	29·677	29·846	29·636	91·1	67·9	23·2	87·2	70·8	16·4	79·0	...	59·0	85·1	75·8

NEWCASTLE, JAMAICA. Lat. 18° 6′ N.

January	26·396	26·550	26·080	78·0	50·0	28·0	69·8	51·2	18·6	60·5	...	...	65·6	63·0
February	26·413	26·530	26·230	76·0	56·0	20·0	71·3	58·3	13·0	64·8	...	...	67·4	61·9
March	26·332	26·386	26·223	71·0	53·0	18·0	67·6	50·7	10·9	62·2	...	...	63·8	59·0
April	26·303	26·406	26·242	73·0	57·0	16·0	70·5	59·3	11·2	64·9	...	...	67·3	63·1
May	26·278	26·352	26·256	75·0	61·0	14·0	72·8	62·7	10·1	67·7	...	...	69·2	65·1
June	26·317	26·404	26·206	76·0	62·0	14·0	73·3	64·6	8·7	68·9	...	...	70·5	66·2
July	26·354	26·381	26·208	76·0	62·0	14·0	73·6	64·6	9·0	69·1	...	...	69·0	66·2
August	26·297	26·360	26·188	76·0	63·0	13·0	74·1	64·7	9·4	69·4	...	...	71·2	67·2
September	26·307	26·387	26·166	78·0	64·0	14·0	75·1	65·1	10·0	70·1	...	...	71·7	68·1
October	26·218	26·303	26·151	76·0	63·0	13·0	74·0	64·4	9·6	69·2	...	...	70·3	67·3
November	26·245	26·337	26·160	76·0	58·0	18·0	72·8	62·0	10·8	67·8	...	...	68·4	65·4
December	26·297	26·410	26·205	80·0	57·0	23·0	73·2	60·2	13·0	66·7	...	...	68·3	64·5
Yearly Sums, Means, and Totals ...	26·313	26·400	26·193	75·9	58·8	17·1	72·3	61·1	11·2	66·7	...	...	68·6	64·7

COLOMBO, CEYLON. Lat. 6° 56′ N.

	*	*	*											
January	29·917	30·123	29·774	95·2	65·5	29·7	90·7	69·0	21·7	79·8	103·0	69·0	82·9	75·2
February	29·862	29·937	29·789	92·5	67·0	25·5	89·8	70·8	19·0	80·3	104·8	69·2	84·6	76·6
March	29·812	29·932	29·779	95·4	69·2	26·2	92·8	72·8	20·0	82·8	108·5	71·7	86·8	78·4
April	29·842	29·967	29·697	97·0	70·5	26·5	93·9	74·4	19·5	84·1	111·3	73·0	84·2	80·2
May	29·848	29·956	29·079	98·0	71·0	27·0	92·5	77·2	15·3	84·8	106·2	74·2	87·0	81·0
June	29·848	30·861	29·781	91·8	72·0	19·8	87·7	74·7	13·0	81·2	103·4	73·1	85·4	79·4
July	29·647	30·697	28·903	95·0	66·0	29·0	90·1	71·3	18·8	80·7	99·6	71·9	83·6	76·9
August	29·670	29·968	28·900	95·5	66·0	29·5	88·9	70·8	18·1	79·8	98·6	71·5	83·0	75·7
September	29·862	29·972	28·782	94·0	65·0	29·0	90·6	70·3	20·3	80·4	101·2	70·8	85·4	75·2
October	29·883	29·989	29·778	95·8	66·4	29·4	90·9	70·6	20·3	80·7	102·0	66·6	85·0	76·5
November	29·896	29·981	29·807	101·0	57·0	44·0	97·5	63·8	33·7	80·6	119·5	72·8	85·2	76·2
December	29·887	29·953	29·720	105·0	70·0	35·0	95·3	72·3	23·0	83·8	112·7	77·8	81·6	74·7
Yearly Sums, Means, and Totals ...	29·831	30·111	29·482	96·3	67·1	29·2	91·7	71·5	20·2	81·5	105·9	71·8	84·5	77·2

* Casella & Co.

No. XXXV—*continued.*

Long. 76° 56′ W. Height above Sea 225 feet.

Hygrometical Results from Glaisher's Tables.						Atmospherical Conditions.											
		In a Cubic Foot of Air.				Number of Days for mean Direction of Wind.					Calculated from Robinson's Anemometer.					Amount of Rain fall.	
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean degree of Humidity.	Mean Weight of Cubic Foot of Air.	North.	East.	South.	West.	Number of calm, or nearly calm days.	Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.	Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of days on which rain fell.	On the Ground.	25 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
65·3	·625	6·6	5·7	53·4	504·5	3·75	16·25	5·50	0·50	0·00	...	127·5	5·0	4·5	4	1·43	1·15
68·2	·690	7·3	5·3	57·6	503·2	2·00	13·25	12·00	0·75	0·00	...	115·5	4·5	4·0	2	0·14	0·06
67·9	·683	7·3	4·7	60·9	505·3	1·75	14·50	13·75	1·00	0·00	...	128·8	4·3	4·1	3	4·04	2·53
69·6	·725	7·7	4·1	65·9	504·7	4·00	12·00	12·25	1·75	0·00	...	135·4	5·2	4·0	9	7·01	6·04
74·3	·849	9·0	4·3	67·3	499·8	3·75	13·75	13·50	0·00	0·00	...	137·0	4·7	3·7	4	5·61	4·22
70·2	·740	7·8	5·9	56·8	499·8	0·75	15·00	13·75	0.50	0·00	...	172·9	6·5	...	5	0·88	0·60
69·2	·712	7·5	6·8	52·3	498·8	2·00	15·00	13·75	0·25	0·00	...	116·3	6·1	4·5	4	2·78	2·16
69·2	·713	7·5	7·0	51·4	498·0	2·25	14·75	13·50	0·50	0·00	...	115·8	5·4	4·2	7	5·06	4·47
73·8	·834	8·8	5·0	63·8	497·4	3·25	13·75	12·25	0·75	0·00	...	88·2	5·7	5·1	10	6·12	5·81
71·1	·763	8·1	4·7	62·8	499·3	3·00	15·25	12·50	0·25	0·00	...	71·7	4·1	5·4	14	8·23	8·01
69·3	·716	7·6	4·8	61·7	501·5	5·25	15·50	9·25	0·00	0·00	...	63·6	4·2	5·0	6	2·57	2·20
66·5	·664	6·9	5·5	54·4	502·6	1·75	17·00	11·50	0·71	0·00	...	71·6	3·0	4·4	2	1·38	1·25
69·5	·725	7·7	5·3	59·0	501·2	38·50	176·00	143·50	7·00	0·00	...	112·0	4·9	...	70	45·25	38·70

Long. 76° 42′ W. Height above Sea 3,800 feet.

60·9	·535	5·9	1·0	84·4	463·6	3·75	11·25	11·75	4·25	0·00	...	...	3·3	...	12	...	...
57·6	·475	5·2	2·2	70·5	462·8	5·00	12·50	10·25	0·25	0·00	...	...	1·9	...	4	...	...
55·0	·434	4·8	1·7	73·8	464·5	8·50	13·25	9·25	0·00	0·00	...	...	3·4	...	4	...	...
59·8	·514	5·6	1·8	77·0	460·8	12·25	10·00	5·75	1·00	0·00	...	...	4·1	...	5	...	...
61·9	·551	6·1	1·7	77·5	458·4	2·75	12·75	15·00	0·00	0·50	...	...	6·0	...	13	...	...
62·9	·576	6·3	1·8	76·5	457·7	9·50	10·50	9·50	0·00	0·50	...	...	4·7	...	2	...	...
64·0	·594	6·6	1·2	84·0	459·8	0·50	15·50	15·00	0·00	0·00	...	...	5·1	...	8	...	...
64·2	·600	6·5	1·8	78·0	456·7	1·75	14·50	14·00	0·75	0·00	...	...	5·5	...	9	...	...
63·3	·626	6·8	1·6	80·0	456·0	2·50	13·75	13·75	0·00	0·00	...	...	4·9	...	9	...	...
65·0	·619	6·7	1·3	83·0	456·0	1·50	14·75	14·75	0·00	0·00	...	...	5·5	...	15	...	...
63·0	·576	6·3	1·3	83·0	458·2	4·00	13·25	12·75	0·00	0·00	...	...	5·4	...	8	...	...
61·4	·542	5·9	1·6	79·0	459·4	1·25	15·75	14·00	0·00	0·00	...	...	3·8	...	2	...	...
61·7	·553	6·1	1·6	78·9	459·5	54·25	157·75	145·75	6·25	1·00	...	...	4·5	...	91	...	...

Long. 79° 49′ W. Height above Sea 18 feet.

70·1	·734	7·8	4·1	65·2	507·6	16·25	4·75	2·50	7·50	0·00	...	117·8	3·7	3·6	6	2·30	1·47
71·3	·769	8·2	4·5	64·6	505·0	4·00	5·00	7·00	12·00	0·00	...	115·6	6·1	1·9	5	1·46	1·20
73·0	·814	8·5	5·0	63·2	501·8	5·25	3·75	7·50	14·50	0·00	...	137·7	4·8	5·3	3	2·48	2·45
77·6	·945	10·1	2·4	80·2	503·9	0·75	2·75	13·25	13·25	0·00	...	163·2	5·5	5·4	16	11·75	10·39
77·1	·933	9·8	3·8	73·0	501·5	0·25	0·25	15·75	14·75	0·00	...	229·3	5·6	5·3	10	4·79	...
75·5	·885	9·3	3·6	72·0	503·2	0·00	0·00	15·50	14·50	0·00	...	310·4	5·8	5·4	12	3·81	2·17
72·5	·796	8·4	3·8	69·2	502·0	0·00	0·00	15·50	15·50	0·00	...	310·9	4·5	4·4	15	3·92	2·19
70·8	·753	8·0	4·0	66·8	503·2	0·00	0·00	15·50	15·50	0·00	...	223·6	4·4	5·1	3	0·11	...
68·6	·700	7·4	5·6	57·4	504·7	0·00	0·00	15·00	15·00	0·00	...	226·3	4·8	5·3	16	2·50	...
70·9	·759	8·0	4·8	62·5	504·9	1·00	4·00	14·25	11·75	0·00	...	248·1	4·2	4·8	16	17·04	14·72
70·3	·743	7·9	5·0	61·0	505·0	3·50	13·75	3·50	4·25	0·00	...	241·0	3·5	5·6	14	14·76	...
70·0	·735	7·9	5·7	68·4	508·6	3·75	23·50	2·50	1·25	0·00	...	114·5	4·0	5·3	8	6·15	...
72·3	·797	8·8	4·2	67·0	504·3	39·75	67·75	127·75	139·75	0·00	...	202·4	4·7	4·8	123	71·64	...

* 18 feet above the ground.

Appendix

TRINCOMALEE. Lat. 8° 30′ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
							Mean						Hygrometer.	
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.	Maximum in Sun's rays.	Minimum on Grass.	Dry Bulb.	Wet Bulb.
January	...	...	...	89·3	66·0	23·2	87·2	73·0	14·2	80·1	...	...	82·4	75·2
February	...	...	...	92·8	70·0	22·8	89·5	72·9	16·6	81·2	...	...	83·5	76·0
March	...	...	...	95·6	69·0	26·6	93·1	73·5	20·6	82·8	...	...	86·2	78·3
April	...	...	...	98·9	75·0	23·9	96·7	75·8	20·9	86·2	...	...	89·1	80·5
May	...	...	...	103·6	70·0	33·6	100·5	77·4	23·1	88·9	...	...	92·5	81·0
June	...	...	...	103·6	75·0	28·6	99·7	77·3	22·4	88·5	...	...	91·2	79·3
July	...	...	...	102·6	67·5	35·1	98·5	74·4	24·1	86·4	...	...	90·0	81·3
August... ...	...	...	...	101·5	67·4	34·1	98·5	73·6	24·9	86·0	...	...	89·1	80·1
September	...	...	...	102·4	71·2	31·2	98·8	74·5	24·3	86·6	...	...	89·1	77·1
October... ...	...	...	...	101·4	68·6	32·8	93·6	72·2	21·4	82·9	...	...	85·6	78·6
November	...	...	...	92·0	66·5	25·5	87·3	70·9	16·4	79·1	...	...	82·4	75·7
December	...	...	...	89·4	64·5	24·9	86·1	70·8	15·3	78·4	...	...	80·7	75·7
Yearly Sums, Means, and Totals ...	...	...	...	97·8	69·2	28·5	94·1	73·8	20·3	83·9	...	...	86·7	78·2

NEWERA-ELLIA, CEYLON. Lat. 6° 48′ N.

January	24·439	24·736	24·394	72·5	33·0	39·5	66·9	48·1	18·8	57·5	118·6	40·3	62·3	58·0
February	24·106	24·174	24·035	70·5	38·0	32·5	72·4	47·1	25·3	59·7	137·0	33·9	67·0	56·9
March	24·095	24·185	24·001	75·5	37·0	38·5	71·7	51·3	20·4	61·5	133·6	39·5	66·2	59·7
April	24·043	24·137	23·960	75·0	45·0	30·0	72·0	53·8	18·2	62·9	129·6	42·9	67·5	62·0
May	24·091	24·130	23·979	74·0	52·0	22·0	66·4	56·3	10·1	61·3	112·7	48·4	62·6	59·5
June	24·053	24·145	23·970	70·0	45·0	25·0	64·2	53·5	10·8	58·9	106·9	48·1	61·3	58·0
July	24·072	24·197	23·962	71·6	42·2	29·4	66·1	52·3	13·8	59·2	120·0	...	62·7	58·3
August... ...	24·074	24·147	24·004	70·0	45·5	24·5	64·9	53·3	11·6	59·1	...	...	61·8	58·4
September	24·056	24·181	23·954	69·6	44·0	25·6	65·8	51·6	14·2	58·7	...	43·6	62·3	59·4
October... ...	24·084	24·187	23·982	68·8	42·5	26·3	63·5	49·4	17·1	57·9	...	39·6	62·4	59·2
November	24·129	24·218	23·986	78·0	32·0	46·0	65·9	43·6	22·3	54·7	...	38·6	62·0	58·2
December	24·145	24·258	24·052	72·3	41·0	31·3	67·7	50·6	17·1	59·1	...	...	63·5	58·7
Yearly Sums, Means, and Totals ...														

VICTORIA, HONG KONG. Lat. 22° 16′ N.

January	30·064	30·222	29·880	73·5	50·0	23·5	65·1	56·5	8·6	60·8	95·9	...	62·6	57·3
February	29·970	30·139	29·765	79·0	48·0	31·0	66·2	56·2	10·0	61·2	95·0	...	62·3	57·7
March	30·046	30·262	29·755	80·5	50·0	30·5	66·4	59·2	7·2	62·8	82·8	...	63·9	61·2
April	30·018	30·181	29·815	89·0	56·5	32·5	75·5	63·3	12·2	69·4	102·3	...	70·2	65·8
May	29·860	30·031	29·760	95·5	64·0	31·5	88·7	74·2	14·5	81·4	121·0	...	81·8	75·8
June	29·767	29·975	29·537	96·0	67·5	28·5	87·0	74·4	12·6	80·7	119·0	...	81·3	75·6
July	29·845	29·964	29·502	99·0	73·5	25·5	93·6	77·5	16·1	85·5	132·2	...	86·3	79·0
August... ...	29·781	29·934	29·659	102·5	76·0	26·5	95·9	78·9	17·0	87·4	143·4	...	88·3	80·1
September	29·749	29·912	29·307	93·0	72·5	23·5	89·5	75·2	14·3	82·3	122·6	...	82·7	76·8
October... ...	29·977	30·158	29·750	91·5	62·0	29·5	83·2	71·1	12·1	77·1	113·0	...	77·9	71·0
November	30·123	30·267	29·975	85·5	55·0	30·5	77·0	62·2	14·8	69·6	101·4	...	70·0	60·9
December	30·197	30·356	30·055	75·0	49·0	26·0	70·4	54·0	16·4	62·2	97·0	...	63·4	53·3
Yearly Sums, Means, and Totals ...	29·949	30·118	29·739	88·5	60·3	28·2	79·8	66·8	12·9	73·3	110·4	...	74·2	67·8

No. XXXV—*continued.*

Long. 82° 0′ E. Height above Sea 25 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.											
		In a Cubic Foot of Air.				Number of Days for mean Direction of Wind.				Number of calm, or nearly calm, Days.	Calculated from Robinson's Anemometer.		Amount of Cloud 0–10.	Ozone Scale 0–10.	Number of Days on which Rain fell.	Amount of Rain fall.	
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.	Mean Weight of Cubic Foot of Air.	North.	East.	South.	West.		Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.				On the Ground.	23 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
70·4	·743	7·9	3·9	67·2	...	11·25	16·25	2·00	1·50	0·00	...	...	3·4	1·3	8	2·72	...
71·0	·759	8·1	4·1	66·0	...	8·25	14·25	4·25	1·25	0·00	...	...	3·3	1·4	8	4·39	...
73·2	·819	8·6	4·7	64·6	...	1·50	11·50	13·50	4·00	0.50	...	...	1·1	0·8	0	0·00	...
75·1	·869	9·1	5·3	62·7	...	11·50	14·25	4·25	0·00	0·00	...	...	2·0	1·1	2	0·59	...
73·9	·838	8·7	7·2	54·5	...	0·00	12·50	13.50	5·00	0·00	...	...	3·0	1·7	4	3·48	...
71·9	·783	8·2	7·2	53·3	...	2·50	0·50	7·00	20·00	0·00	...	...	3·5	0·4	1	0·60	...
75·9	·895	9·3	5·4	62·9	...	0·00	1·25	16·00	13·75	0·00	...	...	4·3	0·4	7	2·33	...
74·4	·850	8·9	5·5	61·1	...	0·00	3·75	16·00	11·25	0·00	...	...	3·7	2·0	6	4·00	...
70·1	·735	7·7	6·3	55·0	...	0·00	4·00	17·00	9·00	0·00	...	...	3·9	1·7	7	2·82	...
74·0	·843	8·9	4·1	68·6	...	1·75	4·25	17·25	7·75	0·00	...	...	3·7	1·7	17	8·39	...
71·2	·765	8·2	3·6	69·2	...	10·50	10·00	2·25	1·25	0·00	...	...	4·9	2·6	21	23·34	...
72·3	·794	8·5	2·7	75·7	...	14·75	15·75	0·25	0·25	0.00	...	...	5·7	2·6	21	17·71	...
72·8	·808	8·5	5·0	63·4	...	62·00	114·25	113·25	75·00	0·50	...	...	3·5	1·5	102	70·37	...

Long. 80° 48′ E. Height above Sea 6,200 feet.

54·4	·423	4·7	1·6	75·5	433·8	8·25	15·75	3·00	0·00	4·00	...	...	5·4	...	12	9·73	...
51·5	·380	4·2	2·4	63·4	431·5	0·25	13·25	8·00	2·00	4·50	...	...	5·0	...	7	6·75	...
48·8	·346	3·8	3·5	51·7	423·7	1·50	13·25	13·75	0·00	2·50	...	...	3·8	...	5	1·47	...
54·4	·423	4·7	2·4	66·0	423·8	1·25	15·25	13·50	0·00	0·00	...	...	6·1	3·9	13	5·08	...
57·7	·477	5·2	2·2	70·5	419·8	0·00	9·00	7·50	14·50	0·00	...	...	5·7	4·1	7	1·05	...
56·9	·464	5·1	1·2	82·0	425·9	0·00	0·50	1·50	28·00	0·00	...	...	7·8	5·0	21	7·52	...
55·2	·435	4·8	1·2	80·5	426·7	0·00	0·00	8·50	22·50	0·00	...	...	8·4	4·0	24	9·23	...
54·6	·426	4·7	1·6	75·0	425·6	0·00	0·00	14·00	15·50	1·50	...	...	8·8	4·1	14	4·95	...
55·9	·447	4·9	1·1	82·9	427·9	0·00	0·00	15·00	15·00	0·00	...	...	8·6	3·6	20	4·09	...
56·9	·464	5·1	1·1	82·9	426·5	0·75	3·00	14·00	13·25	0·00	...	...	7·3	3·3	16	8·50	...
56·4	·457	5·1	1·2	81·2	426·0	5·25	10·25	8·00	6·50	0·00	...	...	7·7	3·5	21	9·04	...
54·9	·422	4·8	1·4	78·0	427·4	1·75	19·75	7·25	2·25	0·00	...	...	7·0	5·6	15	5·78	...
54·8	·420	4·8	1·7	74·1	426·5	19·00	100·00	114·00	119·50	12·50	...	...	6·3	...	175	73·19	...

Long. 114° 9′ E. Height above Sea 47 feet.

52·8	·400	4·4	1·9	70·5	532·0	5·50	19·00	1·00	1·50	4·00	...	...	3·3	2·9	2	0·07	...
53·8	·415	4·6	1·7	74·0	530·6	5·50	13·25	0·75	1·50	7·00	...	...	4·6	2·5	8	1·11	...
58·9	·500	5·5	1·1	84·7	529·7	6·50	17·75	0·75	1·50	4·50	...	...	6·2	3·3	14	3·07	...
62·4	·566	6·2	1·9	76·2	522·5	7·50	12·50	0·00	1·00	9·00	...	...	3·9	3·0	9	5·42	...
71·8	·780	8·3	3·3	72·0	507·3	1·75	12·00	6·75	1·50	9·00	...	...	4·0	2·1	14	17·96	...
71·7	·779	8·3	3·1	73·2	506·2	3·00	19·50	1·00	1·50	5·00	...	...	5·4	3·3	21	14·16	...
74·3	·850	8·9	4·4	67·1	502·6	1·00	7·50	11·25	2·25	9·00	...	...	3·6	1·3	15	9·57	...
74·9	·864	9·1	5·0	64·5	499·6	3·75	5·75	6·75	6·25	8·50	...	...	2·8	1·4	14	3·80	3·54
72·8	·808	8·7	3·3	72·4	504·4	7·25	9·50	1·75	2·00	9·50	...	...	4·5	2·9	17	19·26	18·09
66·1	·645	6·9	3·3	67·4	513·8	9·75	15·00	0·25	0·00	6·00	...	...	5·7	3·3	6	0·52	0·42
53·8	·415	4·5	3·5	56·6	525·5	9·25	11·50	0·00	1·25	8·00	...	...	1·9	3·1	2	0·04	0·08
44·8	·296	3·3	3·2	51·0	534·3	8·00	10·50	0·00	2·00	10·50	...	...	0·8	2·8	1	0·12	0·06
63·1	·609	6·5	2·9	69·1	518·2	68·75	153·75	80·25	22·25	90·00	...	...	3·7	2·6	123	75·10	...

Appendix

AUCKLAND, NEW ZEALAND. Lat. 36° 50′ S.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Mean				Maximum in Sun's rays.	Minimum on Grass.	Hygrometer.	
							Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.			Dry Bulb.	Wet Bulb.
	*	*	*											
January	29·800	30·149	29·162	86·8	50·0	36·8	77·6	55·4	22·2	66·5	114·4	53·0	69·6	64·7
February	29·904	30·123	29·650	87·5	53·6	33·9	79·5	60·0	19·5	69·7	111·6	58·5	72·4	65·7
March	29·964	30·190	28·913	86·2	45·5	40·7	77·0	54·7	22·3	65·8	105·7	51·0	68·5	63·7
April	29·896	30·104	28·986	89·0	44·7	44·3	70·3	51·7	18·6	61·0	95·1	49·2	62·8	57·9
May	30·041	30·373	29·644	72·9	34·8	38·1	65·1	45·9	19·2	55·5	86·4	42·0	58·0	53·8
June	29·952	30·574	29·335	65·0	33·5	31·5	60·7	43·3	17·4	52·0	76·8	39·1	55·1	50·6
July	29·860	30·401	29·248	67·0	37·2	29·8	61·0	44·1	16·9	52·5	78·8	41·2	54·3	50·8
August	29·943	30·309	29·392	69·9	36·1	33·8	61·7	42·8	18·9	52·2	86·9	39·6	54·9	51·7
September ...	29·750	30·429	29·125	73·5	40·5	33·0	63·9	45·5	18·4	54·7	94·4	42·5	57·7	53·6
October... ...	29·896	30·257	29·312	79·1	40·5	38·6	69·1	49·2	19·9	59·1	100·8	46·9	61·9	57·4
November ...	29·875	30·135	29·638	83·1	42·5	40·6	73·5	51·6	21·9	62·5	109·9	49·6	66·9	60·0
December ...	29·796	30·238	29·008	89·5	50·3	39·2	77·7	55·9	21·8	66·8	114·4	54·4	69·3	63·2
Yearly Sums, Means, and Totals ...	29·805	30·323	29·284	79·1	42·4	36·6	69·7	50·0	19·7	59·8	97·9	47·2	62·6	57·7

SCUTARI CEMETERY. Lat. 41° 0′ N.

January	30·114	30·391	29·557	55·4	18·2	37·2	46·2	32·3	13·9	39·2	82·0	27·6	41·6	38·6
February	29·971	30·289	29·621	59·0	28·6	30·4	50·3	37·2	13·1	43·7	85·3	32·9	46·0	43·1
March	29·800	30·033	29·417	75·8	34·4	41·4	61·3	44·5	16·8	52·9	110·5	38·4	55·8	51·1
April	30·004	30·244	29·805	77·8	34·2	43·6	62·5	42·5	20·0	52·5	113·8	37·1	56·6	51·9
May	29·903	30·028	29·706	81·8	42·0	39·8	70·9	49·0	21·9	59·9	122·3	43·6	64·9	59·4
June	29·841	30·032	29·569	90·8	53·6	37·2	78·7	57·7	21·0	68·2	125·7	53·0	74·9	65·8
July	29·767	29·940	29·616	97·2	58·8	38·4	88·3	63·3	25·0	75·8	135·0	57·9	81·4	71·7
August	29·789	30·054	29·517	96·0	57·4	37·6	85·6	61·6	23·0	73·6	132·9	56·5	79·3	70·2
September ...	29·896	30·064	29·713	89·8	53·0	36·8	81·6	58·9	22·7	70·2	128·1	54·7	74·4	68·0
October... ...	30·031	30·261	29·800	76·8	29·0	47·8	63·7	48·5	15·2	56·1	97·9	44·3	57·8	54·2
November ...	29·962	30·247	29·650	63·2	26·8	36·4	55·4	40·6	14·8	48·0	88·7	36·3	50·8	47·3
December ...	30·048	30·364	29·274	62·6	27·8	34·8	49·6	37·1	12·5	43·3	77·0	32·3	46·4	43·4
Yearly Sums, Means, and Totals ...	29·927	30·162	29·604	77·1	38·6	38·4	66·2	47·8	18·3	56·9	108·3	42·9	60·8	55·5

* Barron & Co.

No. XXXV—*continued.*

Long. 174° 50′ E. Height above Sea 140 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.											
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	In a Cubic Foot of Air.			Mean Weight of Cubic Foot of Air.	Number of Days for mean Direction of Wind.				Number of calm, or nearly calm, Days.	Calculated from Robinson's Anemometer.		Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	Amount of Rain fall.	
		Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.		North.	East.	South.	West.		Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.				On the Ground.	22 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
60·9	·534	5·8	2·0	74·1	519·6	8·00	2·25	8·75	11·50	0·50	...	...	6·3	...	7	3·16	2·87
60·7	·532	5·7	2·9	66·2	518·7	8·25	6·00	5·75	8·00	0·00	...	...	6·7	...	12	1·79	1·22
58·9	·516	5·6	2·0	74·0	523·6	11·00	8·50	5·50	6·00	0·00	...	...	5·4	...	7	8·45	0·00
53·8	·414	4·6	1·8	72·5	528·7	2·00	2·50	12·00	13·50	0·00	...	...	6·6	...	14	1·63	0·91
50·0	·362	4·0	1·4	75·0	536·6	4·50	9·25	10·25	7·00	0·00	...	...	5·4	...	16	2·03	...
46·3	·315	3·6	1·3	72·5	538·4	1·50	2·00	11·00	15·50	0·00	...	...	7·0	...	12	2·28	2·03
47·4	·327	3·7	1·0	77·3	537·5	8·25	9·25	6·00	7·50	0·00	...	...	7·2	...	13	4·30	...
48·6	·342	3·9	1·0	78·8	538·2	4·50	0·75	12·75	13·00	0·00	...	...	6·0	...	14	2·47	...
49·9	·359	4·0	1·3	75·1	531·8	5·25	6·00	7·00	11·75	0·00	...	...	7·9	...	18	6·50	...
53·5	·410	4·5	1·6	74·5	529·6	7·50	2·50	8·00	13·00	0·00	...	...	7·6	...	12	1·62	...
54·5	·424	4·7	2·6	64·4	524·2	5·75	3·25	8·25	12·75	0·00	...	...	6·7	...	11	2·48	1·93
55·4	·495	5·3	2·5	67·8	520·1	10·75	4·50	5·25	10·50	0·00	...	...	7·7	...	15	5·36	...
53·6	·419	4·6	1·7	73·5	528·9	77·25	56·75	100·50	130·00	0·50	...	...	6·7	...	151	43·01	...

Long. 29° 3′ E. Height above Sea 60 feet.

34·9	·203	2·4	·7	78·2	536·8	* 8·75	* 7·50	* 4·75	* 3·50	3·00	...	194·8	4·4	6·1	14	2·45	† 1·65
39·8	·246	2·8	·8	79·7	549·0	6·50	8·00	5·50	4·50	1·00	...	202·0	6·8	6·5	15	4·11	3·66
46·7	·321	3·6	1·3	71·6	534·9	2·75	3·00	11·50	8·75	3·00	...	174·3	5·7	5·2	12	3·06	2·69
47·5	·330	3·7	1·4	71·5	537·6	6·75	7·25	5·00	3·50	1·50	...	207·8	4·5	5·7	7	0·47	0·42
54·8	·432	4·7	2·0	70·4	526·7	7·50	7·75	6·25	4·00	1·00	...	175·2	4·0	5·5	9	1·75	1·61
59·3	·506	5·4	3·9	58·5	515·4	11·25	8·75	6·25	0·75	3·00	...	180·7	4·7	5·0	6	3·22	2·93
55·1	·621	6·6	4·8	57·6	507·1	9·00	9·75	6·75	2·00	0·50	...	137·1	2·1	4·5	2	0·06	0·04
64·0	·595	6·4	4·3	58·9	509·6	7·75	13·00	3·75	2·50	3·50	...	202·1	3·0	5·0	4	1·28	1·20
63·3	·583	6·3	2·9	68·4	516·2	10·00	10·50	4·50	1·00	0·50	...	188·0	4·0	4·8	8	6·37	5·36
51·0	·374	4·2	1·2	78·2	536·6	10·50	10·75	2·00	2·25	2·00	...	242·5	7·9	6·0	21	8·67	7·61
43·6	·284	3·3	·9	77·0	543·3	6·50	7·75	7·75	5·00	0·50	..	284·3	6·8	6·4	15	5·41	4·62
40·0	·248	2·9	·8	79·4	549·7	6·50	9·00	6·75	5·25	0·50	...	301·3	5·9	6·4	14	3·52	2·91
50·8	·395	4·3	2·1	70·8	532·9	93·75	103·00	70·75	43·00	20·00	...	212·5	5·0	5·6	127	40·37	34·70

* 34·50 days not taken. † 20 feet above the ground.

APPENDIX No. XXXVI.

REPORT ON HYGIENE FOR 1867.

By E. A. Parkes, M.D., F.R.S., Professor of Hygiene in the Army Medical School.

In this sketch of the chief hygienic points which have been discussed during the past year, I have followed the usual arrangement, viz. :—

I. Enumeration of some of the chief Works on Military Hygiene.
II. General Hygienic Conditions.
  Air and Ventilation.
  Water.
  Food.
  Removal of Excreta.
III. Special Sanitary Inquiries.
  Typhoid Fever at Terling and Guildford.
  The Fungoid Theory of Disease.

Enumeration of some of the chief Works on Military Hygiene.

There is no doubt that the place of honour in this enumeration must be given to the Annual Statistical Reports which are now published in the three Indian Presidencies. The Reports for 1866, from Bengal and Madras, have reached me, and both must be reckoned as among the most important documents ever issued by the Indian Government. The scope of both Reports is extending. The health of the European and native troops is not only detailed at length, but in addition the health of the civil population is receiving attention, and at last the immense work of sanitary regulation for the people of India has been fairly commenced. On looking over these Reports, the labour and care which they show must strike every one ; and it is earnestly to be hoped that the Indian Government will grudge no expense in pushing forward these labours, and in rewarding the labourers in a work which is only second in importance, if it be second, to the great public undertakings of railways and canals. The Reports show a most satisfactory diminution in the causes of sickness of Europeans at many stations, and, what is of still greater moment, they indicate that in many places the causes of mortality are being rigorously searched out and removed. Any analysis of those documents would be out of place here, but they ought to attract the attention of all who are concerned in sanitary work.

Three other documents from India, of the same high class, must be noticed, viz., the Annual Report, for 1867, of the Municipal Commissioner for Bombay (Mr. Crawford), which contains a very valuable paper by the indefatigable Health Officer, Dr. Hewlett ; a Report on the Jails of the Lower Provinces of the Bengal Presidency for 1866-67, by Dr. Mouat ; and a Report on the Composition of the Potable Waters of some Bengal Stations, by Dr. Macnamara. All are full of valuable facts, of which some are noted in other parts of this Report.

A series of papers on the Sanitary History of the Army in India has been contributed by Sir Ranald Martin to the "Lancet" (January to March 1868). Sir Ranald Martin, who may be truly called not only the pioneer, but the never-tired labourer at the work of sanitary reform, has brought together a most interesting and suggestive history of preventive medicine in India. It is to be hoped that these papers will be preserved in a permanent form.

In France, M. Lévy* narrates, in a short pamphlet, the various ameliorations which have been introduced into the French Army; and a similar Report on the health of the Navy has been made by M. Le Roy de Méricourt.† M. Lefèvre has published an interesting history of the Navy Medical Service in France.‡

In Germany, Neudörfer continues the publication of his great book on War Surgery, in which questions of hygiene are occasionally discussed.

In civil life the works on hygiene have as usual been very numerous. I can only notice the Report of the Medical Officer of the Privy Council (Mr. Simon), full, as usual, of most valuable information; and the Report of the Metropolitan Board of Health of New York, a work similar in scope and merit to the Indian Reports. Dr. Lion, of Berlin, has published a Compendium of State Medicine;§ and Pappenheim has commenced a new edition of his Handbook on the same subject.‖

Among many other works of interest may be noticed a comprehensive treatise by Reich on the Causes of Disease.¶ It is marked by the profound erudition which distinguishes all his works, and is an able attempt to carry out the spirit of the motto he quotes from Zimmermann:—"The physician understands no disease if he does not understand its actual and certain cause; he cannot remove it if he cannot remove the cause; the knowledge of their causes is the philosophic knowledge of diseases, and the physician is a philosopher who has this knowledge."

Air and Ventilation.

Two useful works on ventilation have been published during the year. One by Mr. Edwards,** gives a good account of the appliances for natural ventilation in dwelling houses, and is illustrated with plates; and Mr. Roberts†† has re-published his valuable papers, the most important of which is called the "Essentials of a Healthy Dwelling." There is, however, nothing that requires notice in these two works.

In last year's report a formula was quoted from Dr. de Chaunont's pamphlet on ventilation to determine the total inlet and outlet area necessary to supply the requisite delivery at a given velocity in feet per second at the point of entry. Owing to a printer's error the formula was unintelligible. It should be as follows:—Let d be the requisite delivery, and l the given velocity in feet per second at the point of entry. The formula is—

$$\frac{d}{3600\ l} \times 288 = \text{total inlet and outlet area per head in square inches.}$$

To give an example: say 3,000 is the required delivery per head per hour, and that the rate of entry is 5 feet per second, the formula gives then

$$\frac{3000}{3600 \times 5} \times 288 = 48 \text{ square inches of inlet and outlet.}$$

* Rapport sur les Progrès de l'Hygiène Militaire, par M. Michel Lévy, Paris 1868.

† Rapport sur les Progrès de l'Hygiène Navale, par A. le Roy de Méricourt, Paris, 1868.

‡ Histoire de Service de Santé de la Marine Militaire, par M. A. Lefèvre, Paris, 1867.

§ Compendium der Sanitäts-Polizei, von Dr. A. Sion (sen.), Berlin, 1867.

‖ Handbuch der Sanitäts-Polizei, von L. Pappenheim, Band I, Berlin, 1868.

¶ Die Ursachen der Krankheiten, von Edward Reich, Leipzig, 1867.

** On the ventilation of Dwelling Houses, by Frederick Edwards, jun., London, 1868.

†† The Dwellings of the Labouring Classes, by G. H. Roberts, sixth edition, 1868.

Suspended Matters in Air.—Dr. Angus Smith has collected in water the substances floating in the air (in Manchester) by the following plan:—He took a bottle of the capacity of 4990 c. c., and put in a little pure water; he then exhausted the air from the bottle, allowed fresh air to enter; repeated this 500 times, shaking the water in the bottle well between each admission of air. The water was then examined by Mr. Dancer, who gives (*Chemical News*, April 1868) the following account of the microscopic appearances. The powers used varied from 30 to 1,600 diameters.

1. Fungoid matter, spores, of which 250,000 were found in a single drop, or 37,500,000 in the whole of the water. The spores varied from 10,000th to 50,000th of an inch in diameter. Mycelium was also found, and manifestly increased when the water was kept. Some pretty chain-like threads of conidia were visible in some of the examinations. On the third day ciliated zoospores were seen moving freely among the sporidiæ.

2. Vegetable tissue with pitted structure; some samples were evidently partly burnt, and were perhaps derived from wood used in lighting fires. There were also samples of weather-worn vegetation, and a few hairs of leaves and fibres like flax; cotton fibres, some coloured, were numerous. There were a few granules of starch and elliptical bodies like the pollen of the lily.

3. After this dust from the atmosphere had been kept quiet for a few days, animalculæ made their appearance, monads being the most numerous, and among these were some comparatively large species of paramecium aurelia and some very active rotiferæ, but this animal life soon ceased.

4. There were a few fibres of wool.

These observations possess great interest, especially as showing the astonishing numbers of the spores of fungi present in the air of our great cities.

M. Lemaire* who discovered in the contaminated air of a prison numerous transparent, round, or oval forms, finds exactly the same bodies in the perspiration of persons who have neglected the cares of the toilet, and in addition, he professes to have found in the sweat myriads of bacteria. It is known that the watery vapour condensed from the confined air of an inhabited room contains a nitrogenous and putrifying substance. Lemaire asserts that in all these cases it is the result of the development of "microphytes and microzoaires."

Influence of Lights.—Dr. Zoch† has made some observations on the influence of the products of lights on the quality of the air in dwelling-rooms. After referring to the opinions of Pettenkofer and others, that the amount of carbonic acid is a good measure of impurity in the case of respiration and perspiration ("since the changes in the air through organic vapours, and through the increase of carbonic acid are parallel"), he goes on to say that in the case of combustion impurities, the injurious agencies are especially the finely divided unburnt carbon, the carbonic oxide, the carbonetted hydrogen, and in the case of coal gas combustion the sulphurous acid, and therefore that in this case it could not appear at first sight that the carbonic acid would be taken as the measure of impurity. But in reality the carbonic acid may be taken in this case also as a measure of impurity, as it is in proportion to the other substances. Experiments were made by burning definite quantities of coal-gas, petroleum, and oil in a room of a known size.

Natural ventilation was allowed to go on, but it is not stated how much fresh air entered and passed out of the room.

The results were as follows; they are calculated for a room of 100 cubic metres and for an equal degree of intensity of illumination:—

* Comptes Rendus de l'Académie, October 1867, p. 637.

† Beobachtungen über den Einfluss der künstlichen Beleuchtung, von Dr. Branislaw Zoch. Zt. für Biologie, Band II, p. 117 (1867).

Duration of Burning.	Increase of Carbonic Acid per 1,000 volumes.		
Hours.	Petroleum.	Coal Gas.	Oil.
1	0·929	·708	0·537
2	1·456	1·342	1·038
3	1·779	1·513	1·190
4	1·811	1·562	1·229

With an equal illuminating power, it is therefore plain that petroleum gives off more carbonic acid than coal gas, and this than oil. Of course under ordinary circumstances, in a room there is less petroleum or oil burnt than gas, *i. e.*, there is less illuminating power.

With regard to the disagreeable feeling produced by coal-gas combustion, Dr. Zoch thinks that it depends in some measure on the great radiation of heat from the gas flame. But he thinks this will not account for all, and in this opinion all will agree.

*On the presence of Ozone in Atmospheric Air.**—Schönbein observes that no one now doubts that customary oxygen can be altered by various means, as by electricity, in such a way as that it acquires a peculiar smell, irritates the mucous membrane, and acquires an oxidising power which it does not possess in its ordinary condition. It is also admitted, he thinks, that in the atmosphere electrical conditions occur, which, if produced by an ordinary machine in common oxygen, would cause this transformation. This consideration led him years ago to the conclusion that ozone is a regular constituent of the atmosphere. The test, however, which he introduced (viz., the iodide of potassium and starch paper), being coloured by other substances besides ozone, viz., nitrous acid, chlorine, and bromine, &c.; many chemists doubted whether there was any proof of ozone in the air; the appearance of the blue colour was indeed ascribed by many to nitrous acid, which is easily produced in the atmosphere by electrical sparks. If so, it might be supposed that in rain water, or at any rate, in the rain of heavy electrical storms, some nitrous acid would be found, but this Schönbein finds never to be the case, although, if a little sulphuric acid is added to such storm rain water, the iodide and starch paper is rendered blue at once. This arises, he thinks, from the presence of nitrate of ammonia in rain water. He supposes carbonate of ammonia to be continually evolved from decomposing animal substances, and to pass into the atmosphere, where during storms it meets with nitrous acid, and nitrite, and subsequently nitrate of ammonia is formed. Owing to this, he believes that no free nitrous acid can exist in the atmosphere; it becomes combined with ammonia, and is washed down by the rain as nitrite and nitrate, which salts by themselves give no reaction with the iodide and starch paper. However, in very heavy electrical storms it is conceivable that more nitrous acid might be formed than would neutralize the ammonia, and then it might perhaps act on the paper, but this Schönbein thinks would be very seldom.

However this may be, it is certain that free moving atmospheric air has an oxidising power, which is not dependent on nitrous acid.

Customary oxygen is quite indifferent against the sub-oxide of thallium (Tl O), while ozonised oxygen oxidizes it at once to the brown oxide of thallium ($Tl\ O_3$). A paper moistened with Tl O solution is therefore browned at once by ozone, while it is not affected by nitrous acid. Here, then, is a test between the two agents.

Numerous experiments have convinced Schönbein that the browning of the sub-oxide of thallium paper by moving air, runs parallel to the blueing of the iodide of starch paper, though it comes on much more slowly. The browning of the thallium paper cannot depend on a little sulphuretted hydrogen in the atmosphere forming the sulphide of thallium, as lead paper exposed at the same time is not darkened.

* Schönbein, Zeitsch. für Biologie, Band III, p. 101 (1867).

That the browning of the thallium paper is really caused by oxide of thallium is proved by the action on tincture of guaiacum. The brown oxide of thallium colours this blue, but if oxygen is disengaged from peroxide of hydrogen, the blue colour is destroyed. In the same way the iodide of starch paper is made deep blue by oxide of thallium under the action of dilute sulphuric acid. Now the sub-oxide of thallium (Tl O) paper browned by the air, has exactly the same action as paper browned at once by oxide of thallium ($Tl\ O_3$).

Schönbein concludes that it is "more than only probable" that the atmospheric agent acting on the iodide of potassium and starch paper, and on the sub-oxide of thallium paper is one and the same.

Having excluded the action of nitrous acid there remains, he thinks, only chlorine and bromine as possible agencies for causing blueing of the iodide, and browning of the thallium paper. But there is no evidence that either of these exist in the atmosphere.

The thallium paper is far less sensitive than the iodide of starch paper, which must still be used as the best "ozonoscope" available.

Dr. Andrews also has given (Proceedings of the Royal Society, 1868) evidence to prove that ozone really does exist in the atmosphere, a point which some chemists considered not sufficiently proved.

Water.

The very important report, by Dr. Macnamara,* on the water of some of the Bengal stations, has been already noticed. A number of medical officers are now employed under the superintendence of that chemist in making analyses according to a certain plan laid down for them. The water supply of 22 of the chief stations in the Presidency is thus brought under continual inspection. It is impossible to overrate the importance of this report, and it is earnestly to be hoped that similar observations, on Dr. Macnamara's plan, may be instituted in the two other Presidencies. As this report will be accessible to so many of the readers of these pages, I will not make any extracts from it, but warmly commend it to their attention.

Analysis of Drinking Water.—In the report of last year reference was made to the methods proposed by Dr. Frankland, and by Messrs. Wanklyn, Chapman, and Smith, for the determination of the organic matter in water. Since then Dr. Frankland has published his process in detail,† and has also twice lectured on the subject at the Royal Institution.‡ This has given rise to a sharp controversy; Professor Wanklyn, in particular, objecting to several parts of Frankland's process, and affirming that the results obtained from it are vitiated by the necessary errors of manipulation.

On the other hand, the process proposed by Wanklyn, and which is noticed in last year's report, is objected to by Frankland on the ground that all the nitrogen is not liberated from organic compounds by the proposed treatment with potassic permanganate, and that the results are inconstant. Professor Wanklyn admits that all the nitrogen is not given off, but affirms that a definite amount is, and that successive experiments are, therefore comparable.

With regard especially to Professor Frankland's method, the following objections have been or may be taken:—

1. Chemical objections to his method, as in the determination of the nitrate and nitratis, or the determination of the organic nitrogen. On this point it would not become me to give any opinion, but Dr. Frankland's accuracy is so well known, and his method is also so supported by Dr. Odling's authority

* Second Report on the analysis of portable waters in some of the cantonments in the Bengal Presidency, by F. M. Macnamara, M.D., Calcutta, 1868.

† Journal of the Chemical Society, 1867–1868

‡ Proceedings of the Royal Institution, October 1867, p. 109. and Chemical News, May 29 and June 5th, 1868.

that I can hardly believe there is any valid chemical objection to his procedure.

2. An objection has been taken to two assumptions made by Dr. Frankland—first, that the quantity of ammonia derived from the air and rain-water is constant, and that a correction of the same value can always be made; and secondly, that the remaining nitrogen, in whatever form it is present, represents either existing or oxidised sewage matter. The nitrogen derived from nitrates, nitrites, and ammonia, after abstraction has been made of the rain-water ammonia and nitrates, "as truly represents," according to Dr. Frankland, "a quantity of previously existing putrescible organic nitrogenous matter, as that the bones of a megatherium demonstrate the previous existence of an individual of that species." This may be granted, but still exception may be taken to the method of expressing the "putrescible organic nitrogenous matter" in terms of so much sewage. The nitrogenous organic matter may be derived from vegetable matter, or from soils which contain nitrogenous matter, either animal or vegetable, which, however it came there, was not derived from sewage. Dr. Frankland does not altogether deny the force of the objection as to the vegetable origin, but asserts that nowhere in this country, or probably on the continent of Europe, is there such a quantity as to appreciably affect the truth of his proposition. He does not, however, extend his denial to the tropics, where vegetable impregnation may be expected to be more abundant. With regard to the derivation of nitrates, nitrites, and ammonia from soil, Dr. Frankland refers only to the chalk wells, which sometimes furnish large amounts of those substances; he believes that in reality the London chalk water is contaminated with sewage from manuring. He does not, however, allude to the fact that there are certainly some soils which cannot be supposed to have been contaminated in this way, which yield nitrates and nitrites. Not to speak of nitre soils, which would hardly need reference in this country, though it would be different in India; there are some soils which undoubtedly furnish nitrated waters. For example, in the neighbourhood of Netley, under the loose upper sand, there occurs in some places a bed of coherent dark sand, mixed apparently with peat; I have had two opportunities of examining water from wells sunk into this dark soil, which could in no way have got sewage from soakage; both contained nitrites and nitrates in large quantity.

It may be replied, however, that, if attention be paid to the circumstances of each case, such exceptional conditions will be recognised, and not cause any error, and, if they are abstracted, then Dr. Frankland's statement will hold good. Practically, I believe, it does hold good, but still I think we ought to recognise that there are such exceptional cases which may, without care, lead us into error.

3. A third point which more concerns physicians practising in the Army, or as Health Officers in civil communities, remains to be considered. If the examination of water for hygienic purposes is to be of any value, it must be frequent; it must be a matter of almost daily routine of the Health Officers' work. Considering the almost endless sources of contamination, the singular ways in which impurities get not only into cisterns and wells, but into larger sources, examinations must be constant. In order to be so, they must be readily made; must demand little time, and ought to be able to be performed by any medical man, who will be careful and accurate. Any process which is too difficult, and demands too much time or apparatus, throws an obstacle in the way of that constant, efficient overlooking of the purity of drinking water, which it is one great object of sanitary physicians to ensure. Now, if Dr. Frankland's process be essential before an opinion can be given of the hygienic character of a water, it is in vain to expect that Health Officers can find either sufficient time or skill. The analysis must be restricted to professed chemists, and as, even in their hands, the process would occupy time, they would require to be well paid. Hence, very soon, no private persons would go to the expense of an analysis, and though a few great water companies or corporations might, from time to time, have an analysis performed, it requires little knowledge of human nature to feel sure that in a very few years it would be a most infrequent thing. In the case of the Army, in particular, a grievous blow would be given to sanitation. The view of the

Army authorities is that the medical officers of regiments and stations shall be responsible that the drinking water is good, and of course it is necessary that these officers should be able to make a sufficient chemical and microscopical examination to say whether it is good. But it would be hopeless to attempt to teach all medical men such a process as Dr. Frankland's, or to supply his apparatus to every station, and if his process is *essential*, the analyses of drinking water must pass into the hands of a few experts. Then the constant supervision as to purity, which is contemplated, will become impossible. It is, therefore, a matter of great moment to decide if for hygienic purposes his procedure is absolutely necessary. If it is so, no more can be said, and in the case of the Army Medical Service the only thing will be to see how the altered condition can be best met. I will put aside here all consideration either as to its accuracy, or to the regularity of the assumed amounts of rain-water nitrates and ammonia, or the propriety of expressing all "putrescible nitrogenous organic matter" in terms of average London sewage. I will admit, for the sake of the argument, that all these are unquestionable, and will object to the process only on the ground of the time it occupies, the apparatus it requires, and the technical skill it necessitates. As far as I know at present, these would be fatal to its use in the Army. Is it then necessary? My present opinion certainly is that it is not. Are we to suppose that the thousands of analyses by so many chemists in the last ten years have all been insufficient to warrant the opinions based on them? By a careful comparison of the physical and qualitative tests, by determination of the total solids, of those dissipated by moderate heat, and of the amount of chlorine, by the use of the soap test, and of the now despised potassic permanganate (a test which used with due limitation, seems to me to give important information), it can be determined, in a very short time, if a water is wholesome or otherwise, and the steps to be taken can be advised with confidence, *i.e.*, whether and what methods of purification, or if abandonment of the source, is necessary. No doubt there are many lacunæ to be filled up, and parts of the process to be improved, but still reliable hygienic knowledge has been obtained. Almost all over India, and in the other Army stations systematic examinations are now going on, and with great benefit to health. I cannot, therefore, believe that Dr. Frankland's process is absolutely necessary for hygienic purposes, and I believe it would be a most unfortunate thing if public confidence were shaken in the usual plans of analysis, plans which can be made practically useful on a large scale by medical men.

It is, of course, possible that Dr. Frankland may so simplify his process as to make it available for medical men. I am now speaking only of present circumstances. Professor Wanklyn's process (given in last year's report) has certainly an advantage over Dr. Frankland's, in that it is easy, and demands little time. If Professor Wanklyn's statement is borne out, that it will give us the means of determining the ammonia naturally existing, or already formed in the water, that formed from urea, and that from other animal nitrogenous matters, the information would probably be more valuable than that derived from Dr. Frankland's plan; but there is still some doubt on this point, and it will be necessary to wait until a work on water analysis, which is preparing by Professor Wanklyn and Mr. Chapman, makes its appearance.*

After all this discussion, it may be interesting to give a sketch of Dr. Frankland's method, to which I have referred so much; the following extract is from his lecture at the Royal Institution, in April, 1868, and published in the "Chemical News" of May 29th:—

"During the past year the processes of water analysis have undergone a complete revolution. It is one of my duties to report monthly to the Registrar-General upon the quality of the Metropolitan waters, and in carrying out this work, I found the methods of water analysis hitherto employed so untrust-

* Since this Report was in print Professor Wanklyn's and Mr. Chapman's book has appeared. The processes are the same as those already published; they are simple and apparently accurate within the limits laid down by the authors. A full account will be given in next year's Report.

worthy as to render an almost entire remodelling of them absolutely necessary.

"I propose, therefore, first to glance shortly at some of the innovations which have been made in this branch of chemical analysis.

"The first thing to be determined in a water analysis is the 'total solid impurity,' as it is termed, *i.e.*, the total amount of solid matter with which the water has been contaminated since it was submitted to the natural process of distillation. This quantity of solid impurity is determined by taking a known volume of the water and evaporating it down to dryness in a previously weighed platinum vessel. The solid impurity contains both organic matter and inorganic or mineral matter. The most important of these two classes of substances contained in the solid residue is undoubtedly the organic matter. Now, even at the present moment, the actual weight of this organic matter cannot be determined by chemical analysis; in fact there is no process known to science by which its weight can be even approximately estimated; but it is possible to determine, in a given bulk of water, the quantity of the two principal constituents of this organic matter, viz., the carbon and nitrogen which enter into its composition. For this purpose a separate quantity of the water is evaporated down to dryness, but in this case the process is conducted in a glass vessel, and before evaporation the water is mixed with sulphurous acid in order to expel the carbonic acid, which is partly dissolved in the water and partly combined with lime and magnesia. Other precautions also have to be taken, but I hesitate to enter into the details, which I fear would only weary you. However, I think that it is desirable just to show you the general plans on which the determination of the organic carbon and nitrogen, in the residue thus obtained by evaporation in the glass dish, is effected. The operation is performed in the following manner:—The contents of the glass vessel are very carefully scraped out and rubbed off the sides of the vessel by a substance known as chromate of lead, a finely powdered somewhat gritty material, which very completely effects this object, and enables us to transfer the water residue gradually into a piece of hard Bohemian glass tube closed at one end. This tube is then filled up to within about four inches of the mouth with coarsely granulated oxide of copper, and upon that is placed a small quantity of bright metallic copper to decompose oxidised compounds of nitrogen. The tube is then laid in a gas furnace, called 'the combustion furnace.' Before combustion commences, the entire tube is made perfectly vacuous, all the air is pumped out of it, so as to get rid of the atmospheric nitrogen which would vitiate our result. This is done by means of a mercurial pump invented by Dr. Sprengel, by means of which we can extract almost the last trace of atmospheric air contained in the tube. The latter is then gradually heated to redness, during which process the carbon and nitrogen of the organic matter in the water residue are converted, the first into carbonic acid gas, and the second into nitrogen and nitric oxide gases. From the volume of each of these gases the weights of carbon and nitrogen can be calculated with great precision.

"Now, we have still one other process at which it is necessary to glance for a moment, viz., the process for determining the nitrogen existing as nitrates and nitrites. It is called combined nitrogen, but it is not organic nitrogen, although it has in most cases been derived from organic matter. The water residue used for the determination of the amount of solid impurity is dissolved in a small quantity of water; sulphate of silver is then added, by which the chlorides are converted into sulphates. The resulting liquid, after filtration, is transferred to the upper part of a glass tube filled with mercury. It requires to be mixed with rather more than its own weight of sulphuric acid, which is introduced in the same way. It is then only necessary to shake up this mixture, the mouth of the tube being closed with the thumb. Very soon the mercury begins to act on the nitric acid, converting it into a colourless permanent gas called nitric oxide, which only requires to be measured in order to determine the amount of nitrogen originally present in the water in the shape of nitrites and nitrates.

"There is only one other determination I will trouble you with, and this I do principally for the purpose of introducing to your notice a very ingenious piece of apparatus, an application of the Sprengel pump, which has just been

contrived by my assistant, Mr. McLeod. It is designed to extract the gases which are dissolved in waters. By this instrument we can not only measure the whole of the gases present in the water, but we can determine how much of the gases can be expelled at the ordinary temperature, and how much more will come off when you boil the water in vacuo. This gas is then submitted to the usual eudiometrical investigation, to ascertain the quantity of carbonic acid, nitrogen, and oxygen—the three gases which almost invariably occur in the waters submitted to analysis."

Mr. Tichborne, of Dublin,* describes an arrangement for observing the colour of water; he uses a tube a yard long, closed at one end by a stopper, which is used instead of a fixed end, for the purpose of cleaning the tube; on the bottom is fixed a piece of white porcelain, which is looked at through the water; a greenish tinge is said to be almost always produced by desmidiaceæ; a white opacity is said to be frequently indicative of fungoid growths; the finely suspended persalts of iron are recognised by a peculiar ochrey colour. The condition of the iron salts in the water can be easily tested with the same instrument; sulpho-cyanide of ammonium gives a pink tinge indicative of persalts of iron; protosalts only give this colour when nitric acid is added, as well as sulpho-cyanide of ammonium. If the sulpho-cyanide gives a certain tinge of colour, and nitric acid and sulpho-cyanide together give a deeper tinge, both per and proto salts are present.

The same chemist gives the following process for the quantitative determination of the nitrites. He uses potassic permanganate for this purpose, though he considers it worthless for organic matters. He takes eight ounces of the boiled water made up to its original volume, and adds a standard solution of potassic permanganate, as recommended by Professor Miller. The amount of permanganate corresponds to readily-oxidisable organic matters and to nitrites. He now takes another eight ounces, and adds a few drops of pure sulphate of ammonium, evaporates to dryness, at a temperature below 212° Fah., dissolves in eight ounces of pure water, and estimates again the amount of permanganate required. He believes that the evaporation will produce no other change than destruction of the nitrites, and therefore that the difference between the first and second results will give the amount of permanganate destroyed by the nitrites as distinguished from the other oxidisable substances. It is to be wished, however, that experiments had been made to test the possible change in oxidibility of organic matter during evaporation.

An extremely able article on Water Analysis is contained in Watt's Dictionary of Chemistry (vol. v., p. 1,009); all the latest processes (including Frankland's) are very clearly given. The use of the potassic permanganate is not altogether given up, but is still recommended as an accessory test. The article is too long to be given *in extenso*, but attention is directed to it.

Action of Water on Lead.—It has always been seen that the action or non-action of water on lead could not be entirely accounted for by the usual statements on the subject, and lately Dr. Frankland has made a curious observation, which may throw light on the subject. He found that water which acted on lead lost this power after passing through a filter of animal charcoal. He discovered this to be owing to a minute quantity of phosphate of lime passing into the water from the charcoal; on comparing two natural waters, that of the river Kent, which acts violently on lead, and that of the river Vyrnwy, which, though very soft, has no action on lead, he found that the latter water contained an appreciable amount of phosphate of lime, while none could be detected in the Kent water. This observation may probably explain much of the discrepancy of evidence in respect of the action of soft water on lead.

Influence of Impure Water on Disease.—The influence of impure water on the spread of several diseases has been described by Dr. Stevenson Macadam.†

The foul condition of the well waters of many towns and villages in Scotland has had, according to this observer, a marked influence on the spread of

* Chemical News, March 27th, 1868.

† Transactions of the Royal Scottish Society of Arts, vol. vii, p. 341 (1867).

cholera. In all cases the abatement of the disease was coincident with the shutting up of the impure wells and the introduction of a fresh and pure supply. Several instances are given of what are certainly striking coincidences. But, in addition, Dr. Macadam, &c., bring evidence to show that possibly even erysipelas and throat ulcers may have a water origin. He quotes the following extract from a letter of "one of the most intelligent and active medical practitioners in Scotland":—

"Erysipelas, low fever, diarrhœa, ulcerated throat, and ague, were constantly occurring in houses where all the necessary sanitary precautions were carried out, and where the inmates were enjoying all the comforts of life as far as diet went. My own household was seldom free from erysipelas, and my attention was directed to a cesspool 20 yards distant from my well, which was immediately removed, since which time erysipelas has entirely disappeared from my house. The same condition of matters existed in the premises of two families who were similarly affected. Those cesspools were abolished, and they have had no recurrence of the disease. In a fourth instance, in which from circumstances the cesspool could not be dispensed with, the use of the water was discontinued, and erysipelas was never seen again."

Without arguing that this evidence is quite sufficient to prove the connection of eyrisepelas and water-impure from sewage, it is yet highly striking.

Ulcerated throat is ascribed by the same writer to a similar condition, as well as the diseases now frequently traced to bad water, viz., "low fever," diarrhœa, and ague. A case is mentioned in which a cesspool is near a well, and unless that is cleaned out regularly every few weeks, ague makes its appearance in the family. As far as I know, this is the first time ague has been ascribed to fæcal contamination, through its connection with the water of malarious districts is now generally admitted.

Two cases in which typhoid fever was probably connected with impure water are given in reports made to the Medical Department of the Privy Council. One is the report by Dr. Buchanan of an outbreak at Guildford, and by close enquiry it seems to be almost absolutely proved that sewage contamination of one principal source of water supply was the cause. The other instance is the fever at Terling, to which reference will be presently made.

In contradistinction to the statements in Germany, that cholera does not spread by the agency of water, must be placed an observation of Richter,* who in a little outbreak of cholera in a sugar manufactory, found the drinking water which was contaminated by the latrines to be the principal cause of the outbreak.

Food.

Destruction of Alcohol in the Body.—The difficult question of the effect produced on alcohol in the body has been examined independently at Dorpat by Dr. Schulinus,† and at London by Dr. Anstie and Dr. Dupré.‡ The results of both series of observations are in accord, and show that we must again modify our views on the destruction of alcohol. Both Schulinus and Anstie consider their experiments prove absolutely that alcohol must be destroyed to a large amount in the body. It seems quite certain that when the amount of alcohol which is taken by a healthy person does not exceed 1½ ozs. of absolute alcohol, and especially if this is taken in divided doses, the amount which passes off by the kidneys is exceedingly small; whereas any large dose of alcohol, either in health or disease, which produces signs of narcosis "immediately causes unchanged alcohol to be eliminated in notable, though still not in large quantities in the urine."—(Anstie.) The important inference is, that the presence of alcohol in the urine is a sign of narcosis.

The evidence given by both Schulinus and Anstie as to the amount eliminated by the other excretory organs is far less complete than that which concerns the urine. Both writers assume that the admissions of Perrin, Lallemand, and Duroy, that they were able to recover only a small amount of alcohol from the skin and lung-excreta, prove that little alcohol passes off by

* Archiv für Heilkunde, 1867, p. 474.
† Archiv für Heilk., vol. ii, p. 97, 1866.
‡ Lancet, vol. ii, p. 190, 1867.

these channels. Neither writer has examined the amount which may pass out by, or remain for some time in, the intestines. As far as these excretions are concerned there appears to be weak points in the evidence, but still are hardly so weak as to warrant any scepticism of Schulinus' and Anstie's main conclusion.

This conclusion is also based upon direct experiments by Schulinus of this kind. A definite quantity of alcohol being given to an animal, and the amount escaping by the kidneys being known, the animal was killed, and the amount of alcohol recoverable from the whole body determined. The full amount could never be recovered in this way, and as the amount passing by the skin and lungs is assumed to be small, the inference is that some alcohol must be destroyed in the body. The question will here turn as to the accuracy of the plan for determining the quantity of alcohol in the organs. Admitting this, and also that little has passed by the lungs, the conclusion would be inevitable, that some, perhaps a large part of the alcohol is destroyed in the body. The experiments of Schulinus show that while the blood always contains more alcohol than the organs, yet that in the organs there is a very even distribution of the alcohol, and that the brain and the liver do not contain more than other parts as usually supposed.

If there is no error in all this, alcohol must be once more regarded as a food, as well as an agent acting directly on the nerves. It is, however, pretty clear that the rate of destruction is soon arrested, or rather that the power of destruction in the body is not indefinite. The alcohol will then collect and produce signs of poisoning. Much as has been done by the labours of Anstie and Schulinus, there are still many obscure points about this matter.

Injurious Effects of Lathyrus Salivus.—Dr. Irvine, of the Bengal service, who formerly wrote on the curious paraplegic symptoms produced by the use of the kessaree-dholl (especially, though not exclusively, in men) has contributed another important paper on this subject.* The earliest symptoms produced by the use in bread of this vetch are gastro-intestinal, such as indigestion, colic, and flatulence. The palsy of the lower limits follows on this. It produces injurious effects on horses in the same way, but affects oxen much less, or not at all. Dr. Irving points out the resemblance of the symptoms in man to the "Barbiers" of Bontius.

Is it possible that the paraplegia is caused by paralysis of the vaso-motor nerves of the spinal vessels, following irritation of the vast nervous plexus lying below the gastro-intestinal mucous membrane; or is there some poison in this food which acts directly on the cord?

Removal of Sewage.

During the last year no essential change has occurred on this subject. The commission appointed to consider the best means of preventing the defilement of rivers have now presented three reports, and are still making enquiries. Committees of the Houses, both of Lords and Commons, have also examined the supply of water in certain districts, and bills to prevent sewage contamination of large gathering grounds (as, for example, of the river Lea) are now before Parliament. The question of the disposal of the sewage assumes every year greater importance. Little more is known of the success of Captain Liernur's air system (given in last year's report); but it does not seem to be gaining ground. The dry system in one or other form is coming more and more into favour, and Mr. Taylor's turn-table appears to give a good deal of satisfaction.

What appears to be a very good dry closet for India has been devised by Mr. Charles Turner, C.E., of Southampton, and it may be useful to give a sketch of this plan.

It it quite evident that one of the hardest tasks which lies before the sanitary officers of India will be the methods of removing sewage from the large Indian cities. In some cases a good water supply and sufficient outfall may lead to the use of water-sewerage, but in many instances there will be neither water supply or means of making sewers, or power of disposal of the dilute

* Indian Annals, January 1868, p. 89.

sewage. In these instances, and they are probably numerous, some form o the dry system must be adopted. But the dry system has its own difficulties, and these are considerable. There is one peculiar to India, and that is the universal use of water for ablution, whereby from 12 to 20 ozs. of water are added to the urine, and increase therefore the amount of fluid which has to be absorbed by the dry earth or other material used. Consequently, if dried earth be used, a greater quantity and more frequent drying is necessary, and the difficulties felt even in Europe of supply and removal of earth will be still more increased.

The earth system as used by Mr. Moule, and which is so useful in this country, does not therefore quite meet the case in the Indian cities. Mr. Taylor's turn-table would seem to be more applicable. It separates the urine from the solid discharges, and allows the latter to dry, which, in most parts in India, would occur very rapidly. No earth need be used, though it can be employed if desired, or a little cheap disinfecting powder may take its place, But Mr. Taylor's turntable is a rather elaborate piece of machinery. If it were possible to find something more simple, it would be a great point.

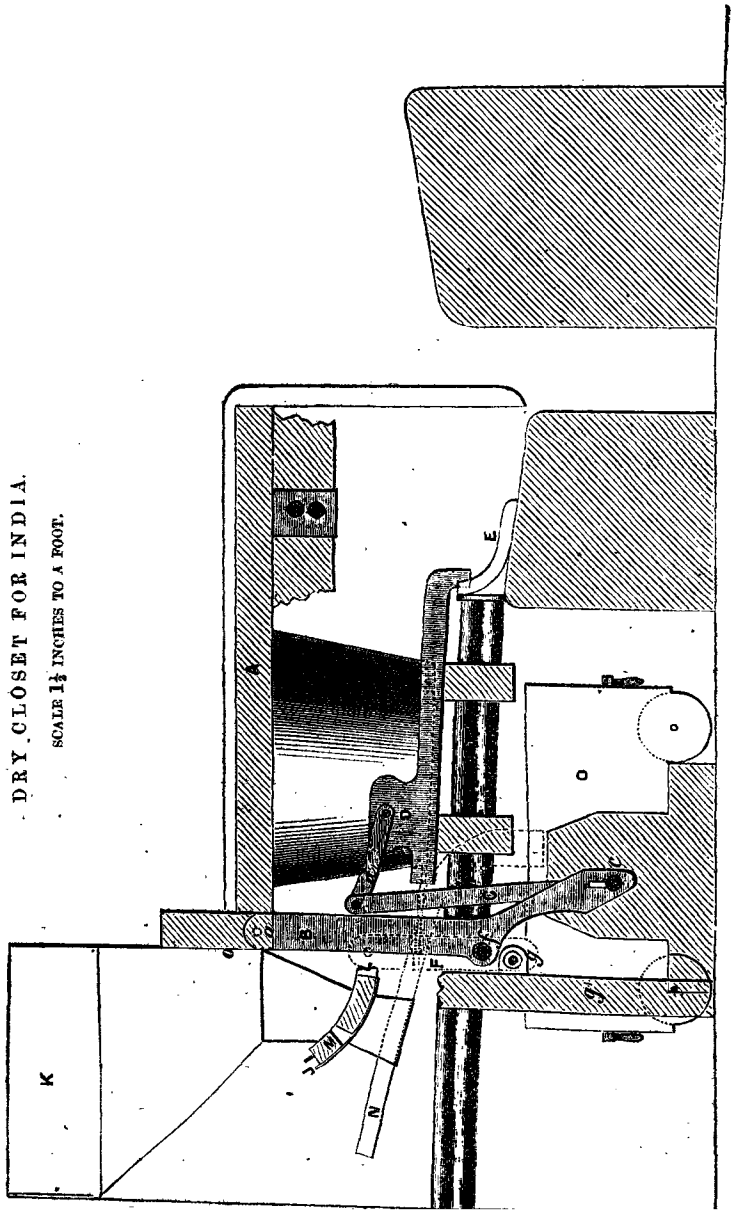
Last year Dr. Niven of the Bombay Medical Service suggested to Mr. Charles Turner, of Southampton, the desirability of adapting Moule's earth closet for India, in such a form as to separate the urine from the fæces, and thus to facilitate the use of a smaller amount of earth. Mr. Turner has made a model which seems likely to work well, and at any rate deserves a trial. I think it may be useful to give here his description, and a plan of the closet with which he has favoured me, and, though experience has not yet proved that it will answer, there seems a probability that it will do so.

Description of Closet for India, arranged by Mr. Charles Turner, C.E., Southampton. — "As it is not the custom of the Hindoos to make use of closets with seats, but to squat on the ground with their feet on each side of the hole, I propose to substitute for the seat a flap in the floor, with shallow ledges at the sides to prevent the urine from running off. This flap would be covered with thin milled sheet lead, galvanised iron, or any other suitable material, the end of which would be prolonged and hang down over and below the front, so as to conduct any urine falling on the flap into the gutter under the floor. This flap would be hung by strong strap hinges to wrought-iron pins, *a a*, passing through the main bearer A. A lever arm, B, is fixed to the main bearer A, and connected by a pin *c* (working in a slot) with the second lever arm C and lever *d* 1 to the sliding shutter D; the levers carrying the shutter with them as they move backwards and forwards. The front edge of the shutter has a drip to it to guide the water into the water-table E, which communicates with the channel gutter, before mentioned, under the floor. The shutter is set at an inclination, in order to prevent any water remaining on it. The bottom of the pit would also incline from both ends towards the channel gutter. The lever arm F is connected by a pin *f* (working in a slot) with the first lever arm B. This lever F is shrunk on to a bolt G turning in eye-bolts *g g*, passing through the upright *g* 1. Two sets of levers, H H, are shrunk on to the same spindle, and are also connected at the other end with the slide I at the bottom of the earth-hopper K. The bottom of the hopper is formed by a curved wrought-iron plate turned up at the sides, and attached by screws to the wooden side of the earth-box. The slide is formed of thin wrought-iron, and has two pockets in it, L and M. The back pocket M is brought over the edge of the curved plate J, and discharged by the forward motion of the apparatus when in use; and the front pocket L is discharged in a similar manner by the return action when the apparatus is out of use. The earth discharged from the back pocket falls on the inclined board N, and slides down it into the pail O, forming a dry bed to receive the deposit. Part of the earth discharged from the front pocket passes over the perforated board P into the hopper, and falls upon the excrement deposited. Part passes through the holes formed in the board P to the board N, and slides down it, effecting the same object. It would be easy, if desirable, to form a connection with the water channel, so that a portion of earth may be thrown into it by each movement of the apparatus; but I think in so hot a climate as that of India it would not be wise to contemplate the preservation of any larger quantity of urine than what would fall on the

shutter, and be retained by the dry earth. As the shutter is closed, and all access to the solid excrement is prevented, when the apparatus is out of use, it may be cleansed by pouring down pails of water, provided that the person pouring in the water does not tread upon the flap in the floor; or the back of the pit may be left open to the weather, provided, of course, that the outlet of the water channel is not obstructed. Nothing more is required to work the apparatus than the weight of the person using it. The pail should be removed and emptied, and the earth-hopper filled up, if not more than six persons are using it, once in ten days."

DRY CLOSET FOR INDIA.

SCALE 1½ INCHES TO A FOOT.



SPECIAL SANITARY INQUIRIES.

Typhoid Fever at Terling.—The connection of a severe outbreak of typhoid fever at Terling in Essex with impure water, appears probable from Dr. Thorne's* and Mr. Haviland's† Reports. The drinking water is almost invariably drawn from shallow unprotected wells sunk in the gravel, and liable to contamination on all sides, not only from percolation from numerous badly constructed privies and manure heaps, but from surface washings. Typhoid fever is commonly present in a slight degree, and sometimes there are rather severe outbreaks, but the attack which has lately occurred is unparalelled in its extent and in the suddenness of its occurrence. Between November 13th or 14th, 1867, and the 29th January, 1868, 260 persons were attacked, out of a population of about 900, and some others have occurred since. Between December 4th and 15th there were 30 cases; on the three following days no less than 53 fresh cases occurred. The disease was spread evenly through the village, and attacked the better houses equally with the poorer. Women and children were at first attacked in a far higher proportion than adult males, which is attributed by Dr. Thorne to the men being away at work during the day, and drinking chiefly beer, while the women drank water

The chief reasons which lead to the idea of the drinking-water being the chief agent in the origin of the disease appear to be the suddenness, universality, and extent of the outbreak, and the almost universal contamination of the wells with fæcal matters, which contamination had been increased by the following conditions:—Before the outbreak there had been a prolonged drought, and the ground-water level had sunk very low; heavy rain and snow, followed by rapid thaw, then caused the water in the wells to rise very rapidly. Mr. Haviland and Dr. Thorne suppose that fæcal accumulation in the soil, and surface impurities, had been in this way suddenly carried into the wells. As Dr. Thorne points out, this state of things is quite in antagonism with Bühl's views of the effect of the ground-water level. While it was low in Terling there was no fever, when it rose fever occurred; whereas, on Bühl's hypothesis, the reverse should have been the case.

As negative evidence the following is given:—Two wells supplying two large groups of cottages were secure from contamination, and none of the people supplied from these wells had fever.

Additional evidence on this point is given by Mr. Salter.‡ The water of one particular well, to which he refers, was found to be pure; 28 families used this water, and not one person was attacked, "though scarcely another building in the place was exempt."

The water of four wells was analysed by Dr. Miller. In two cases it was very impure; in the other two cases, the water was good in one instance, and not very objectionable in the other, though it was taken from the well of a house where ten cases had occurred, with three deaths. In this case, however, Dr. Thorne had ascertained that the well had been in all probability contaminated by fæcal percolation, though at the subsequent time the water was taken for analysis this must have ceased.

The precise mode of introduction or of commencement of this fever was not determined. The first case was in a young woman living at a dairy farm, who had returned from Frome in Somersetshire a month before, and a few days afterwards suffered from transient diarrhœa. Three weeks afterwards she had unequivocal typhoid fever. This was about 15 to 18 days before the outbreak. All the discharges from this patient passed into the Ter, a small river from which some of the villagers derived their drinking-water. This woman was not aware of any typhoid fever at Frome, though it appears§ that five or six cases of typhoid were in the Union workhouse there. It seems quite possible

* Reports on an epidemic of Typhoid Fever at Terling, to the Medical Officer of the Privy Council (January 1868, *et seq.*)

† On the epidemic at Terling, by A. Haviland, M.R.C.S. (Medical Times and Gazette, January 11th, 1868.)

‡ Medical Times and Gazette, March 7th, 1868.

§ See Mr. Haviland's paper in the Medical Times and Gazette, January 11th, 1868, p. 41.

she may have acquired it there, or as typhoid fever was not uncommon in Terling, she may have caught it at home, and yet have been the means of spreading it widely. There appears to have been a general impression that the dairy farm was the starting-point of the fever; and it has been even conjectured that the milk was adulterated with contaminated water, and thus spread the disease; but Dr. Thorne considers this unlikely, and there is certainly no decided evidence in its favour.

Dr. Buchanan has also contributed a very important Report* on the fever at Guildford, which makes the origin by water in the highest degree probable.

On Fungoid Origin of Disease.—The evidence which has been brought forward with respect to the fungus discovered in cholera discharges, and the increasing prevalence of the view that the wonderfully rapid growth and peculiar action of fungi are the only things in nature which seem in any way to offer a parallel to the marvellous spread of epidemic diseases, make it desirable to bring into a short chapter the present position of the fungoid theory of disease.†

In spite of the labour which has been bestowed on this subject little positive is known on the connection of fungi with epidemic diseases. But the reason of this is obvious. In the first place, the study of the different fungi is a matter of great difficulty. Botanists who have taken up this especial branch of their subject, are only now beginning to know the singular transformations which fungi undergo under different conditions of air and soil. Even now there are very serious differences of opinion between professed mycologists (as, for example, between de Bary and Hallier) on very vital points. The relation of vibriones to fungi, and the mode of origin of the former, are still warmly debated, and observations apparently most positive in character have been made in quite contrary senses.

The different forms which fungi assume during their growth; the resemblance or outward identity which different fungi have at certain stages; the necessity of obtaining by careful cultivation a special character of growth for perfect identification; the numerous sources of error introduced by accidental admixtures, all render this study a very perplexing one. It is, in fact, just one of those cases in which experts in this particular domain must be called in to aid physicians. It is not a subject which can be investigated with effect in the absence of special training in what is an obscure part of botany.

Even Pasteur has been led into some errors from deficient botanical knowledge, and it is to be feared that over hasty description and imperfect identification have already cumbered nosology with some unnecessary names.

One of the most important steps in recent mycology has been the discovery by de Bary, Tulasne, Hallier, and others, that certain forms or stages of growth, which were described as species, are common to many fungi. A few years ago we used to hear a good deal of the leptothrix, or the oidium, as kinds of fungi, but these are only stages, and botanists are now beginning to speak, not of leptothrix or oidium, but of the leptothrix, or oidium stage. So again, the term achorion (like leptothrix), as applied to a particular fungus, is now no longer used; the so-called achorion Schonleinii, for example, is merely the conidian form of the penicillium crustaceum *Fries*. The penicillium, indeed, which is so common in and on the human body, is liable to extraordinary alterations in form, according to the matrix on which it grows, and yet these forms have been considered as separate fungi. One form will appear in the epidermis of men bathed as it is with an acid fluid; another in acid milk; another in the thin alkaline, or neutral fluids of the mouth; a fourth in strongly saccharine fluids; a fifth in some oils, &c.

The polymorphism of fungi, and the exact recognition of the different kinds of air, and soils which nourish each form, has not yet been thoroughly

* Tenth Report of the Medical Officer to the Privy Council for 1867 (1868).

† I have not referred to Mr. Darwin's hypothesis of pangenesis, which, if correct, would have to be applied to contagious diseases. It is to be hoped that at present this hypothesis may not be extended beyond the limits laid down so cautiously by Mr. Darwin.

worked out, but enough is known to show that both a great simplification and an explanation of very puzzling facts await us.

While the tendency is thus to show that what appeared to be different fungi, are in some cases really growths of one kind, the new observations enable sharper distinctions to be drawn between what are really different forms. By careful cultivation on chosen soils (if this term may be used to express the menstrua on which the plant is grown, and which may be water, or glycerine, or a solution of fæcal matter, or a slice of a lemon or other substance) the peculiar fructification which distinguishes each kind can be made out. It must be said, however, that there are still great differences of opinion between botanists, and we must not suppose that there is yet any perfect agreement as to the relations of different forms.

If from this difficulty in identification there is a risk of the same thing being described under several names, so also there is a risk of different things being confounded. This has been shown by the history of the cholera fungus; if we can trust the observations of Hallier and Thomé, it is a perfectly distinct plant; but it is so extremely like some common fungi, that it requires the most careful cultivation to produce the form by which it is identified. Botanists must therefore render this service to physicians, or physicians must qualify themselves by careful study for this investigation. If this is not done we cannot expect this obscure subject of the connection of fungi and epidemic diseases to be cleared up.

There are many undoubted diseases arising from fungi, as for instance the parasitic skin diseases.

The very widely diffused penicillium crustaceum plays here the most important part; it causes herpes of animals and men, favus, mentagra; and possibly plicapolonica; and the transference of these diseases from animal to animal, and from animal to man, is an example of what is no abuse of terms to call contagion.

So also the aspergillus, which was at one time classed by de Bary as a penicillium, produces in its achorion form undoubtedly the pityriasis versicolor, and in one or other forms of leptothrix or acrosporon may constitute a part of the fungus which is found in the mouth or in other cavities of the body, or in diphtheritic or other membranes.

A different fungus, described first by Hallier under the name of diplosporium fuscum, is also found in diphtheritic membranes, and the so-called oidium albicans (a form of stemphylium polymorphum (?) of Hallier) forms the principal part of the fungus found in thrush and occasionally on the genitals. The puccinia favi of Ardsten has been entirely rejected by Hallier, who speaks also with doubt of the Leptomitus urophilus of Rayer and Robin, and of the other form of Leptomitus noticed by Gübler and Wilkinson. I may notice here an interesting addition to our knowledge of the effect of fungi in causing diseases of the throat, which has been made by Dr. William Smith, in his pamphlet "On the Concretions of the Tonsils" (1866). He describes and figures a leptothrix form of a fungus (*penicillium*) to which these concretions, and the granular matter on the tonsils seem to be entirely owing.

The exact place of the sarcina in the mycological chart (if indeed it is a fungus at all) is not fixed, but if the observations of Brinton, which have been partly confirmed by Tilbury Fox, are correct, it is also a form of penicillium; and Hallier's ("Gährungserscheinungen," 1867, p. 73) observations on the great similarity to sarcina, presented by colonies of yeast cells derived from the cultivation of ergot, also make it extremely probable that sarcina is really a fungus.

The mycetoma Carteri, which gives rise to the "fungus foot," of some parts of India, is another undoubted example of a disease arising directly from the growth of a fungus.

The fungus which Dr. Massy observed in the vesicular and ecthymatous form of lichen tropicus, in Ceylon (Army Medical Report for 1865, vol. vii., p. 543), is also perhaps the penicillium crustaceum, as it thrives well in India.

So far the morbific action of fungi is fairly made out; that diseases of the skin, and even of the sub-cutaneous tissues of the hair, nails, mouth, tonsils, vagina, end of rectum, and perhaps the prepuce and urethra, and even the

inner renal passages arise from their lodgment and growth on these parts will be allowed on all sides.

It is when we pass beyond this that we arrive at the debateable land.

Perhaps the best way of seeing how the question stands will be to pass in brief review the several diseases which have been attributed to the action of fungi.

In all these inquiries two points have to be distinguished. If a fungus is found in the human body, it points out something unhealthy, of which the fungus may be the cause or merely the sign; the first point is to identify the fungus, and the second is to show its relation to the state of the body in which it is found.

The botanist must settle the first point; the physician, by experiments and evidence, must decide the second.

The Fungoid Origin of Splenic Apoplexy.—It will probably be by observations on the diseases of animals that this intricate question will receive its final answer, and in this direction the observations on the so-called splenic apoplexy (*sang-de-rate*, of the French, and *milzbrand*, of the Germans), or carbuncular disease* of sheep, cattle, and swine, are the most important. I believe it is now admitted on all hands that this disease can be communicated from animal to animal† by inoculation of the blood.

The active agent or poison is, therefore, something in the blood. Some years ago, Pollender‡ described in the blood of the spleen in particular, and in that in the neighbourhood of the carbuncles, numerous extremely small motionless solid bodies which he termed "vibriones." The accuracy of these observations was confirmed by Davaine's later researches, and by Professor Brauell, of Dorpat. The bodies are called bacteridia by Davaine. Although Leplat and Jaillard, on the strength of some observations which are rendered uncertain on account of inaccuracy of diagnosis, have strongly combated the statement, yet the enquirics especially by Devaine, Brauell, Signol, Delafond, Megnin (in the horse), and others, have quite proved it, and I believe that as the observations are now very numerous, it is correct to make the following statements:—

That the rod-like bodies, or so-called bacteridia, are always present in the splenic blood, or in small amount in the general blood of animals with splenic apoplexy; that they occur before death, and that they have been also found in the blood of a man§ who died of the disease. Bodies supposed to be of similar nature have been found in blood, after death, of animals who did not die from splenic apoplexy; this is admitted by Brauell, who points out, however, that the great distinction is that in the one case they arise during life; in the other only when post-mortem decomposition has commenced.

It has been stated, however, that similar bodies occur in the blood in other diseases;‖ in some of these cases (those by Fuchs, Tigri, Leisering), the evidence is unsatisfactory, as the examinations were only after death; in others (as those by Signol) the disease was really splenic apoplexy. Objections may in fact be taken to almost all the counter evidence hitherto brought forward, to show that these motionless solid line- or rod-like bodies are found before death in the blood in other diseases, except splenic apoplexy.

Another statement has been made of so extraordinary a nature that it seems difficult to attach credence to it. It is asserted by MM. Béchamp and Estor (Comptes Rendus de l'Acad., May 1868) that bacteria in the form of granules exist in all animal cells, especially in the hepatic cells; that when they pass out from these cells they lose their normal form and assume the shape of a chaplet-like torula, and eventually elongate and form the bodies

* The carbuncles are not invariable, but are very frequent.

† The disease cannot be given to birds or to carnivorous animals, nor is it easy or perhaps possible to give it by inoculation to swine, though they take it readily when they eat the flesh or blood of animals dead of Splenic Apoplexy.

‡ Quoted by Brauell in Virchow's Archiv, Band xi, p. 137 (1857).

§ In a man in Dorpat (Carl Schuppe) who died from accidental inoculation, and whose blood was examined by Brauell. Virchow's Archiv, Band xi, p. 138.

‖ An enumeration and short criticism of those statements will be found in Schmidt's Jahrb., January 1867, p. 39.

known as bacteridia. They are therefore supposed to be the effect of a disease setting them loose, and not the cause of the disease.

But now (omitting the statements of Béchamp and Estor as improved) let us apply our two questions.

What is the nature of these rod-like bodies; what are their diagnostic, microscopical, and chemical marks? It is probable that several things have been confounded. Hallier affirms that the motionless bodies have nothing whatever to do with the rapidly-moving vibriones, and if he is correct, this might explain a statemant of Brauell's, that those bodies, though at first motionless, do really acquire the power of motion a few days after death. Brauell may have confounded here (if Hallier be correct) the so-called bacteridia with vibriones. Hallier,* in fact, looks upon the bacteridia as real fungi (Leptothrix, or to use the term he now prefers, Mycothris, swarms), and on the vibriones as certainly entirely different, and as probably belonging to the oscillariniæ, and he affirms† that even Meissner,‡ whose authority is so great, has confounded in his examinations of the splenic blood, true fungi, and vibriones. On this point a sharp controversy has lately arisen between a lady, Frau Lüders, and Hallier; the former asserting, and maintaining her assertions,§ that she has seen the vibrio lineola formed from the spores, or spouting threads, of mucor or botrytis, and the latter rejecting all her statements as erroneous. Professor Hensen, of Kiel, who has examined Frau Lüders' preparations, expresses himself as having no doubt between the relations of vibriones and mucidineæ, as stated by her.

While the bacteridia would thus by both parties be considered as fungi, and by one as vibriones also, since these are held to be fungi, some other observers have denied their vegetable nature.

They have been considered crystals of albumen, or of hæmoglobin; at one time it was thought that they might be particles of coagulated fibrine or detached bits of the lining membrane of the vessels, but these views are now given up.

By far the most probable opinion is that they are true fungi, but it is most desirable that their exact characters and their relation to moving vibriones should be settled. Even their chemical reactions are not yet known.

According to Delafond, the splenic apoplexy bacteridia are not changed by alcohol and ether, but Brauell saw them crumple up in these fluids. Delafond, Pollender, and Davaine, found them unaltered in potash and soda solutions; Brauell found they were destroyed by cold potash solution of 50 per cent. of potash, and by 10 per cent. hot solutions. Delafond found them unchanged in nitric acid. Both Brauell and Pollender found them dissolved after a time. Sulphuric acid rapidly destroys them, according to Delafond; slowly, according to Brauell; very slowly indeed, according to Davaine; and not at all, according to Pollender.

These remarks show how much we have yet to learn from botanists and physiologists before we can definitively answer the first question—what are these bodies?

Coming now to the second question, what is their relation to the disease in which they are found? we have three opinions—

1. That of Davaine, based on what he considers proved, viz., the invariable connection of these bodies with the blood in that particular disease, and in no other.

According to Davaine, they are therefore the cause of the disease splenic apoplexy.

2. That of Brauell. Admitting, also, their invariable presence, Brauell does not consider them the cause, but merely as the invariable attendants of changes in the blood, which are the true cause. If the view of Béchamp and Estor be correct, this would be the real explanation.

* Archiv für Mikrosk. Anat. Band II, p. 67.

† Gährungserscheinungen, p. 98 (1867).

‡ In his paper "Ueber das Wesen des Milzbrandes," Berlin, Klin. Wochenschrift, 1864.

§ Archiv für Mikrosk. Anat., Band, III, p. 317 (1867).

3. That of Leplat and Jaillard, who deny altogether the invariable connection, and consider them accidental and unimportant.

I do not allude to another view that some have propounded, that the bacteridia are not the cause, but simply its carriers; this seems not only a refinement, but an assumption.

The evidence is strongly against the opinion of Leplat; for, while the evidence of their constant presence before death in the splenic apoplexy is very strong, that of their presence in other diseases before death is very weak.

Between the two first opinions it would be unsafe to judge, but Davaine's view certainly appears the more philosophical. It is admitted by both that the cause is in the blood; here is (we assume it for the moment) a recognised invariable pathological condition; if there is another constant blood condition which is the substance to this shadow, it is but fair to throw the proof on those who affirm it.

Still the matter remains, I conceive, at this point; bending certainly in one direction, but not entirely settled; and yet the impression made on the mind by considering all the evidence in favour of Davaine's view, is certainly one rather of agreement than of denial. But now let me pass on to a human disease.

The Fungoid Theory of Cholera.—The view has been held by many for years, and on strong arguments derived chiefly from analogy, that nothing can explain the diffusion of cholera except the hypothesis of its spread from some form of cryptogamic life.*

That a fungus exists in immense quantities in the cholera stools seems to be now conclusively shown by the observations of Klob, Thomé, and Hallier.† The statements of Brittan and Swayne in the cholera of 1849 are so far confirmed that, while those gentlemen overlooked the spores, they yet discovered some of the more advanced forms, and what they saw (according to my best recollection) may be found accurately pictured by Hallier.‡

Now here there is no question as to the fungoid nature; it is undoubted; the unmistakeable forms have been obtained by culture. It is not only a fungus, but it is a peculiar one.

On this point the observations of Hallier are of the greatest importance. We must remember that Hallier is one of the highest authorities on fungi, and that he speaks with all the weight of an impartial experimenter. He grew the fungi found in the cholera discharges, derived from Berlin and from Elberfeld; and made altogether, with these two specimens, twenty-two culture experiments. The result was the finding of a cystic fruit-form of urocystis which was entirely new to Hallier, and which he considered had never previously been seen by any one in nature.§ That this was the cholera contagium, he believes, because he found it attacking the epithelium, and living and growing at the expense of the albuminous constituents of the alimentary membrane.

But as it is impossible to suppose this form to live long in the intestinal canal of man, he concludes that it must have an origin outside it, under special conditions of some kind. One thing seems certain, that one of the conditions is a high temperature, such as may be given either by a tropical climate or by the interior of the body. A temperature of 54° F. prevented the fructification, and so did a very high temperature (145° F.). Another point is that this particular cystic form demands a highly nitrogenous menstruum in which to develope. It is also prevented by acidity.

It must be remarked here, to prevent mistakes, that common penicillium growths, in some cases fructifying (a very unusual circumstance), are also found in the vomited fluids of cholera, which, as is well known, are often acid.

The existence of a fungus in immense quantities in cholera discharges

* Cowdell on Cholera, 1849.

† *Vide* my last report in the Army Medical Report for some details.

‡ Das Cholera Contagium, 1867. The cystic forms in figure 2 (*h & i*), are wh I fer to, as similar to the bodies noticed by Brittan and Swayne.

§ Das Cholera Contagium, see preface, and also page 23.

(quantities so great as sometimes to constitute the whole discharge) is now therefore certain. According to Hallier, the fungus is not a European one, and demands special conditions for full development. Its origin is not yet known; and though Hallier is inclined to think it may be connected with rice, this is merely a supposition pending more complete inquiry.*

So far, then, the botanists have done their part, if nothing has to be said on the other side.† Now comes the question for physicians—is this fungus the cause of cholera? No one can blame medical men if they hesitate to speak decidedly on a matter so grave, and in fact it would not be proper as a matter of evidence to decide; but we are bound to see what can be said for and against such a view.

First, it seems probable that the fungus is universal in the cholera stools. I rely for this on my own observations in 1849, and later epidemics. Without knowing what they were, I found in all typical cholera stools the spores which Thomé and Hallier have now figured. I was also shown by Dr. Brittan, in 1849, what I feel convinced must have been the cystic form, though this is far less often seen than the dark granule-like spores. It may be said, however, that this evidence is not enough to prove universality, and that we must wait for further researches. Admitting, however, with this reservation, the presence of the fungus in cholera discharges, the following inferences at once arise:—We have to explain a foreign origin of the cause, an agent which comes to Europe *ab externo*, and which is in some way connected with human intercourse. The fungus would answer these conditions. This cause is in some way most undoubtedly connected with the cholera stools, and apparently increases or developes shortly after their passage from the body, and yet the cause is evidently very rapidly destroyed. The fungus answers here also. In European countries the cause has a limited period of activity, but in different places and times shows considerable modifications in this respect. As far as we can see, the conditions which affect the duration of its action are precisely those which would affect the life and growth of fungi. The cause affects very greatly the whole intestinal tract, and its destructive influence here is quite poisonous, and yet no poison can be detected by chemistry. The fungus increasing in its wonderful rapid manner is known to do so by attacking the albuminous textures on which it seats itself, and answers this condition also. In every cholera epidemic, two classes of cases are seen which have always been referred to the same cause, viz., a peculiar diarrhœa (cholerine without or with only slight algide symptoms), which does not kill; and a mortal disease in which the blood is profoundly altered; and of these two forms the first often leads to the second, but not invariably; but a man with the first disease may give another man the second.

For the first time a reasonable explanation of these puzzling phenomena of cholera may be found in the hypothesis that the fungus may sometimes be entirely in the alimentary canal; and then, with whatever severity it acts, it will not kill. There may be immense purging, but, as is well known, the most profuse diarrhœa is not the most mortal form. Indeed the cases with least diarrhœa are the worst, as if the fungi were got rid of by the purging. In other cases, however, especially in many with slight purging, the fungus may possibly pass into the blood; and we know full well how easily its fine spores will make their way through the minutest holes. In the blood it will find an alkaline fluid and abundant oxygen, and may there grow at the expense of the albuminous constituents of the serum, or even of the red corpuscles. Here, however, we step beyond the evidence, as the fungus has not yet been found in the blood. Still it has never been looked for properly, and it may be there; and if one observation of mine can be trusted, the spores have been seen in

* Mr. Berkeley in his replies to Dr. Milroy's question (Gardener's Chronicle, May 1868) seems to me hardly to do justice to Hallier, when he speaks of his views as entirely hypothetical. Hallier's statements of what he saw and obtained by culture are from observations and experiments; his suppositions of origin are very cautiously worded, he merely throws out hints for future enquiry; his views are certainly anything but hypothetical.

† It is understood that De Bary is about to publish a pamphlet on the "Cholera Fungus," but I have not yet seen it.

the first urine passed after the algide stage. How completely the hypothesis of a fungus of this kind may explain all the symptoms of cholera is seen at a glance.

The cause, again, of whatever nature it may be, is transmitted by drinking water, but it may also travel through the air. It is wonderfully affected by ventilation, elevation of ground, and other circumstances which influence the movement of air.

A fungus answers all these conditions, and it is the only thing we can conceive that does so. The old doctrine of fomites, or its modern exposition as given by Beale and Morris, does not perhaps so well accord with the water-spread of cholera, and yet we must admit this to be a reality in some cases.

The cause, again, is sometimes greatly influenced by the nature of the ground, by rainfall, and by temperature; and yet there are singular discrepancies on all these matters in different places, which are puzzling enough if a material, but not living, cause is supposed.

The life and growth of a tropical fungus accords better with all these varying facts than any other view.

The treatment of cholera in its early stage is wonderfully successful. Most of the best remedies in the earliest stage are destroyers of fungoid life, such as mineral acids, spirits, peppers, bitters (especially quinine), opiates, &c.

The destruction of the intestinal fungus before it can penetrate into the blood would explain why arrest of the diarrhœa is often curative, and yet why it may not be so if the fungus has got beyond the intestinal canal.

The prevention of cholera is easy, if perfect sanitary conditions can be insured over a large district; and even in a place which has bad and good districts side by side, the influence of good sanitation is quite evident. The reasons of success, the occasional partial failures, can be generally easily understood with the fungoid hypothesis, but with no other.

Finally, with the hypothesis of a tropical fungus, with peculiar fructification demanding very special conditions, doubtless being destroyed in immense amount by adverse agencies, and only living and growing here and there with difficulty, and being propagated almost wholly by human intercourse, we have for the first time an intelligible idea why it sometimes spreads over the colder regions of the world and then disappears, why its outbursts should be so irregular, and apparently so mysterious.

If it be said that after all there is too much assumption in all this to bring conviction, it must at any rate be admitted that the key *fits* the lock better than any other, and that at the very least the strongest possible case has been made out for immediate and complete investigation in India. That investigation would start on a better basis than at any former time. A clue has been given which may or may not lead us through the labyrinth, but which at any rate should be followed. The nation that holds India is under the strongest moral obligation to settle this point, and her Medical Officers have possibly in their hands the solution of a problem which affects the happiness of the entire human race. It requires, however, very special botanical knowledge and experimental skill to work the subject out thoroughly, and it must be hoped that the requisite knowledge will be found.

The Fungoid Origin of Malarious Disease.—The connection of malarious disease with fungi is as yet uncertain. Attention has several times been directed, especially by Von Mühry, to a possible connection with plant life. Dr. Massy, of the Army Medical Department, has published in last year's Annual Report* a very interesting account of the prevalence of fungi at Jaffna. He shows the great prevalence of fungi, their passage into the drinking-water, and apparently their presence in the excretions of persons suffering from ague. They were found in the urine drawn off with the catheter, and in one case partly formed a urinary calculus.

Dr. Massy observed increased prevalence of malarial disease to be coincident with the increased development of fungi; and his observations suggest an explanation of the well-known power trees exert in stopping the transit of malarious particles. He found the leaves of such trees greatly affected with black rust.

* Army Medical Report for 1865, vol. 7, p. 539.

These observations recall those of Salisbury,* who attributed intermittents to palmellæ, and who went so far as to call the plant the "ague palmella."

The nonconfirmation of Salisbury's statements about the cryptogamic origin of measles, and what seem to be the too sketchy character of his descriptions and figures, have somewhat shaken faith in his observations; yet his statements about ague, if he has truly reported them, seem to me very strong.

Hallier seems inclined to think that if the cause of ague be a plant it is more likely to be some form of the oscillarinieæ than a fungus, and herein he approaches the view of Von Mühry. A little evidence in the same direction has been given by Schurtz†, who traced, he believes, a very mysterious case of ague to the fact of the patient having very largely cultivated oscillarinieæ in his bedroom.

A very curious outbreak on board ship at sea has been given by Holden,‡ in which the emanations from a large quantity of mould which formed in certain closed store-rooms which were exposed to bilge-water, together with the bilge-water emanations themselves, caused ague in no less than eight persons.

On the whole, while the evidence is very fragmentary, enough exists to make the investigation of the possible connection between ague and minute algoid, or it may be fungoid plants, a matter of very great moment.

Fungi in other Diseases.—The existence and, if they exist, the connection with the disease, of fungi in the vaccine vesicle, in the cuticle of scarlet fever, in the smallpox pustules, in the discharges and blood of typhoid, in the blood and urine of rheumatism,§ in the base of syphilitic chancres, and in the uterine and renal passages, are all matters on which at present it would be premature to speak. It seems, indeed, as if the fungoid origin of disease were about to be pushed to an extreme; and certainly we have a right to demand much more exact and extended observations than would appear to have been made, as far as we can judge from the observations on these diseases already published.

We may, however, say without rashness, that the astonishingly rapid growth and peculiar actions of fungi, their indubitable power of effecting chemical changes in albuminous and saccharine and even oily fluids, and their extraordinary facility of penetration through animal and vegetable structures, are all properties which seem able to explain more completely than in the case of any other substance we know, the alterations in the blood and organs which follow the introduction of the so-called zymotic poisons, and must make us all anxious to submit these matters to the test which can alone satisfy—that of thorough and conscientious inquiry.‖

* American Journal of Medical Science, January 1866, p. 51.

† Archiv für Heilk., 1868, p. 69.

‡ American Journal of Medical Science, January 1866.

§ Dr. Salisbury affirms that in the blood and urine of rheumatic fever he has discovered a peculiar fungus. Although these statements have been made for a year, I am not aware of any confirmation.

‖ Since this Report was in type, a new work by Professor Hallier (Parisitologische Untersuchungen) has reached me, in which the fungi occurring in various diseases are described and identified. The work reached me too late for analysis, but good abstracts have been given of it in the Lancet, and in the Medical Times and Gazette for August 1868. While the existence of fungi in vaccinia, variola, typhoid fever, measles, gonorrhœa, &c., has been placed beyond doubt, the evidence connecting the fungus with the cause of the special disease is most imperfect.

APPENDIX No. XXXVII.

ON THE RELATIVE POWER OF CERTAIN SO-CALLED DISINFECTANTS IN PREVENTING THE PUTREFACTION OF HUMAN SEWAGE.

By E. A. Parkes, M.D., F.R.S., Professor of Hygiene in the Army Medical School.

The following experiments were undertaken to determine more precisely than has yet been done the relative powers of carbolic acid, and of other disinfectants in preventing the putrefaction of sewage, and to fix the quantity of carbolic acid which should be used for a definite weight of solid excreta.

Three sets of experiments were made—the first in October and November, 1867; the others in March and May, 1868. I have given them in chronological order.

First Series of Experiments.

A quantity of healthy human fæces was mixed with dysenteric stools, and with some urine, and was left for some days until it had become highly offensive.

Ten ounces by measure of the putrid semi-fluid mass were placed in 16 glasses.

The amount of 10 ozs. was taken, as I presumed it would represent pretty nearly the amount of solid discharge from an adult in 24 hours, and pretty nearly one-quarter of the liquid discharge.

To each 10 ozs. of the sewage, which was in a state of decomposition and highly offensive, the following substances were added:—

Name of Substance added.	*Amount of Substance added.*
1. Calvert's crystallized carbolic acid	60 grains.
2. M'Dougall's crystallized carbolic acid	60 „
3. Calvert's liquid carbolic acid, ordinary quality (price in bottle, 2*s.* per pint)	½ fluid ounce.
4. Calvert's liquid carbolic acid, ordinary quality (price, 1*s.* per pint)	½ „
5. Carbolic acid (liquid), bought from Randall and Co., in Southampton, and manufactured by Bolton and Co., of London, said to contain 90 per cent. of pure acid, colourless	⅛ „
6. Carbolic acid, bought from Randall and Co., and manufactured by Bolton and Co., dark coloured, and impure	⅛ „
7. Cresylic acid, bought from Randall and Co., impure and dark coloured	⅛ „
8. Calvert's carbolic acid powder	½ ounce avoir.
9. M'Dougall's disinfecting powder (carbolates and sulphites of lime and magnesia)	½ „

Name of Substance added.	*Amount of Substance added.*
10. Condy's fluid, obtained from hospital stores, and containing from 80 to 90 grains of solid permanganate per pint	1 fluid ounce.
11. Chloride of lime (liquid), obtained from Hospital Stores	1 "
12. Sulphate of iron (in crystals)	60 grains.
13. Burnett's fluid (chloride of zinc)	⅛ fluid ounce.
14. Larnaudes' patent fluid (mixture of sulphate of iron and sulphate of zinc)	⅛ "
15. Mixture of Condy's fluid and sulphate of iron ..	½ fluid ounce to 30 grains.
16. Sewage, without addition.	

These deodorants were selected as the most common. Unfortunately the perchloride of iron, which is one of the best deodorants, was accidentally omitted. There are various makers of carbolic acid besides those referred to, but I could not readily procure acids from all, and I took Bolton's acid (obtained from Randall & Son) as the representative of the usual commercial acids.

The quantities thus used were selected as far as possible in conformity with the statements of the makers when given, but as the quantitative relations of the deodorants to sewage are not stated by the makers with any precision, the experiments were tentative only. The results showed that less carbolic acid might perhaps have been added, but that larger amounts of permanganate of potassium, sulphate of iron, and chlorides of lime and zinc, were necessary.

Bolton's pure acid was added nearly in the same proportion as if it had been crystallized, as it was said to contain 90 per cent. The impure acid was added for comparison in the same proportion.

Before the addition of the deodorants the sewage was highly ammoniacal from decomposition of the urea. Under the microscope no fungoid growth was seen, nor was any subsequently developed.

Possibly the very strong ammoniacal solution stopped all growth of this kind.

After the addition the samples were placed in a room with a fire, the temperature of the room averaging about 50° Fah.

The immediate effect of all the above substances was to greatly lessen, but not entirely to remove, the nauseous sewage smell, except in the case of the chloride of lime, which gave out a strong smell of chlorine, quite concealing all sewage smell.

Of the different substances, Burnett's fluid and the sulphate of iron had the least effect on the sewage smell at the time of addition.

The course of events subsequently was this:—In 24 hours after addition all the sewage to which carbolic acid was added smelt of carbolic acid, but scarcely at all of sewage. If anything, the crystallized acids, and Randall's pure liquid acid had not so thoroughly destroyed the sewage smell as the impure acid and the impure cresylic acid. Both Calvert's and M'Dougall's powder were very effectual.

All the other samples except the chloride of lime had a perceptible sewage smell, which, in the case of the zinc preparations was very peculiar. The permanganate sewage was decidedly offensive, the mixed permanganate and iron slightly less so than the pure permanganate.

In 48 hours the carbolic and cresylic acid series remained as before, the permanganate sewage was becoming more putrescent, and the sulphate of iron sewage was almost as putrescent as the sewage without anything added, which was kept for comparison.

The chloride of lime sewage had a most peculiar, but not putrid smell.

The chloride of zinc and Larnaudes' patent fluid had also a very peculiar nauseous, but not putrid smell.

In 72 hours the sulphate of iron, the permanganate, and the permanganate and iron samples, were all in full tide of putrefaction.

The carbolic acid series were the same as before.

If anything, the pure crystallized acids were not quite so good as Randall's pure acid, and as Calvert's two liquid acids, but the difference was very slight.

Of the powders, M'Dougall's seemed slightly the best, but there was scarcely any smell with either.

One week after the addition, the sewage to which the carbolic acids, and the cresylic acid and the two powders, had been added, remained in *statu quo*. Putrefaction seemed almost perfectly arrested. Twelve days after this, and nineteen from the commencement of the experiments, the condition of the carbolic acid series was still unaltered, except that a distinct smell of sewage began to be perceptible in the glass with M'Dougall's powder, and in two days more it was becoming offensive. At this time, also (21 days from commencement), the sewage with Calvert's powder, which had kept good so far, began also to become offensive.

The carbolic and the cresylic acids remained, however, unchanged. Indeed the very slight sewage smell which had from time to time been perceptible in some of them could no longer be perceived; there seemed to be no odour of any kind.

The chloride of lime had had throughout a very peculiar nauseous, but not fæculent, smell; evidently some decomposition was going on. The two zinc samples retained to the 21st day their peculiar odour. It was certainly different from ordinary putrefying sewage, but was equally unpleasant; and the fact that it was perceived only in those two samples in which zinc salts were used, showed that it must have been in some way connected with the action of the zinc.

As before said, the sewage with the permanganate of potassium, and the sulphate of iron, together or separate, had quite decomposed.

As these experiments were very unfavourable to the influence of sulphate of iron and alkaline permanganate, either alone or mixed, and as much influence is attributed in Germany both to sulphate of iron and to potassie permanganate, it was thought desirable to repeat the experiments, using, however, double the quantity of the salts.

On November 21, 1867, I added, to equal quantities of the same putrid sewage matter as in former experiments, the following salts, viz.:—

1. Sulphate of iron, 120 grains.
2. Condy's fluid, 2 fluid ounces.
3. Sulphate of iron, 60 grains, and Condy's fluid, 1 fluid ounce.

At the time there was some but no great effect produced on the fæcal odour, but the pure Condy's fluid was certainly the most powerful in lessening it. In two or three days all the three samples were as offensive as before, and on the 3rd of December they were all very offensive; the simple sulphate of iron sample being the most so, and the simple permanganate the least.

These experiments show that even in these large quantities sulphate of iron acts very imperfectly; and Condy's fluid, useful as it is in many circumstances, yet must be added in large quantities where any amount of putrid fæcal matter has to be dealt with.

Second Series of Experiments.

All the foregoing experiments were carried on in a room the temperature of which varied from 35°, 40°, to 50° and 60° F. I thought it would be desirable to try the effect of a higher temperature on the carbolic acid preparations. Accordingly, in March 1868, in warm weather some further experiments were made; but instead of a temperature of 50°, the samples were kept for several hours every day in a temperature of 80° to 100° F., and at no time were exposed to a temperature lower than 50°. In this way it was attempted to imitate the temperature of the tropics.

The sewage matter used was unmixed with urine, as it seemed to me best to avoid the very strong ammoniacal action of decomposing urea. The sewage was mixed with water, and allowed to stand in a warm place (70° to 100° F.) till it became offensive. Ten measured ounces of this thick, dark-greenish,

offensive liquid (representing nearly the excreta of one man for a day) were treated with the following preparations :—

1. Calvert's crystallized acid .. .. 30 grains.
2. M'Dougall's crystallized acid .. .. 30 „
3. Calvert's liquid disinfectant, price 1s. per pint .. .. 1 fluid ounce.
4. Calvert's disinfecting powder .. .. 60 grains.
5. M'Dougall's „ .. .. 60 „

The offensive odour was lessened at the time of addition by all, but was not entirely removed. In fact it was quite perceptible, except in the case of M'Dougall's powder, which spread over the surface of the liquid, and seemed to prevent the odour from rising or to overpower it. The liquid disinfectant seemed to act better than the crystallized acids, probably from its more perfect mixture.

During the following three weeks the samples remained much the same. The two crystallized acid samples seemed rather more offensive than the other; and, of the two, M'Dougall's was perhaps most so, but the difference was slight.

The amount of the crystallized acids were then increased to 60 grains, and this seemed still more to lessen, though not entirely to remove, the sewage smell. The liquid acid acted very satisfactorily.

The two powder samples were less offensive than the acids, and, of the two, M'Dougall's powder was the freest from odour.

Third Series of Experiments.

In the two former series the sewage matter had been allowed to putrefy before the deodorants were added. In this series, in May and June 1868, fresh human sewage, unmixed with urine, was taken, and 4 ounces, by weight, were put into five glasses. The weather was very warm, the mean daily temperature in the open air of May being above the average.

1. Four ounces of solid excreta, 10 fluid ounces of distilled water, and 30 grains of Calvert's crystallized carbolic acid.
2. As above, with M'Dougall's crystallized carbolic acid, instead of Calvert's.
3. As above, with half fluid ounce of Calvert's liquid (price 1s. per pint), instead of the crystallized acid.
4. Four ounces of solid sewage in 10 ounces of distilled water.
5. Four ounces of solid sewage and 10 fluid ounces of urine (sp. gr. 1020).

The immediate effect of the liquid carbolic acid was much greater than that of the crystallized acids; it removed almost completely the sewage smell, while it was far otherwise with the crystallized acids. No. 4 was feebly acid, and No. 5 strongly acid.

In 24 hours the two crystallized acid samples had a decided unpleasant sewage smell. The liquid sample smelt only of carbolic acid.

The water sample was becoming very offensive. The urine sample was already strongly alkaline, from ureal decomposition.

In four days' time Nos. 1 and 2 were decidedly more offensive, though still far less so than No. 4, which was becoming quite putrid.

A week after the first addition 30 more grains of the crystallized acids were added. The effect was decidedly to greatly lessen the sewage smell, yet still it did not entirely remove it. At this time the sewage in distilled water was quite putrescent, and mould was rapidly forming on the surface.

The urine sample was very ammoniacal and disagreeable, but had no mould on the surface.

I could not undertake to say that the urine sample in any way decomposed faster, or was more offensive than the sewage with distilled water. The smell was different, but was equally disagreeable. Certainly the absence of the urine did not delay the decomposition of the sewage, as is sometimes stated.

Three weeks after the addition the samples remained nearly as before. The two crystallized acid samples smelt partly of carbolic acid, partly of sewage; that to which Calvert's acid was added was the most offensive. The liquid carbolic acid sample was precisely in the state it had been the first day after addition; the smell of carbolic acid was quite distinct, and the fœcal odour was slight.

The pure water sample was extremely offensive; the mould had disappeared from the surface; it had become viscid, whereas the carbolic acid samples were partly liquid, partly with a deposit. The urine sample was also most offensive, and was extremely viscid, so that a glass rod dipped in it could not be washed clean by a very strong stream of water.

The three carbolic acid samples were all strongly acid, far more so than at first. The water sample was either neutral or slightly alkaline, but in a far less degree than it had been at first.

Under the microscope, vibriones (*i.e.*, extremely small, round, and linear bodies in rapid movement) were seen in all the samples, but were most abundant in the water sample, and least so in the liquid carbolic sample. They were not numerous in any of the carbolic samples, or in the urine glass.

Fungi were seen in rows of oblong cells in the water sample, but not in any of the others.

Conclusions.

1. At temperatures ranging from 50° to 100° Fahr. the carbolic acids and their preparations prevent the putrefaction of sewage to a great extent; measure for measure they are all decidedly superior to the other substances noted. Double the quantity of sulphate of iron (viz., 120 grains to four ounces of sewage) had very little preservative effect at all, and the solution of the alkaline permanganate appeared almost as useless in the quantity added (two fluid ounces of Condy's fluid to four ounces of sewage), nor did the mixture of sulphate of iron and alkaline permanganate appear at all more powerful.

The zinc salts were also decidedly inferior, measure for measure, to the carbolic acids (crystallized and liquid), as the effluvia, though changed in character, were extremely offensive. The same thing may be said of the chloride of lime; when the smell of chlorine had gone off, it was clear that some kind of offensive change was going on.

I have no doubt, therefore, of the superiority of the carbolic acid series to all the other substances tried in the proportions given.

2. The amount of carbolic acid must, however, be larger than is usually stated. Of the commercial crystallized acids, at least 60 grains is necessary for the solid discharge of a man daily at a temperature of 50° Fahr., and even then this amount does not prevent fæcal smell, and does not entirely arrest the development of rapidly-moving vibriones. At a greater temperature (80° to 100° Fahr.), the effect is less marked, and more of the acid must be used.

3. The liquid preparations of carbolic acid are more efficacious than the crystallized acids, and the impure preparations appeared more powerful than the pure. In the last series of experiments, 60 grains of crystallized acid were much less powerful than one-half fluid ounce of Calvert's cheap carbolic acid liquid.

4. No decided difference could be traced between the carbolic acids of different makers. M'Dougall's crystallized acid in some experiments appeared slightly superior, in some slightly inferior to Calvert's, but the difference was not marked, and Bolton's liquid acid was as good as either.

5. The two disinfecting powders (Calvert's and M'Dougall's), though of such very different composition, appeared practically equal. Calvert's powder is carbolic acid, mixed with alumina and silicate of alumina; M'Dougall's is a mixture of carbolate and sulphite of lime and magnesia, and it makes the sewage to which it is added strongly alkaline, while Calvert's powder does not at the time affect the weak acid reaction of healthy sewage. Yet one powder for 17 or 18 days prevents putrefaction as well as the other.

On the Influence produced on me by the Sewage Emanations.

The very offensive effluvia which I was obliged to inhale in large quantities during the experiments produced a good deal of discomfort, and even indisposition. I am fully aware of the imperfection of any evidence of illness which

depends on mere sensation; imagination plays so powerful a part as to often mislead us, and moreover a disagreeable sensation may be recurrent, that is re-induced even by memory without the actual cause being again present. And yet I cannot but believe the sensations I experienced during these experiments were real, and were produced by the effluvia.

During the experiments of October 1867, when I was inhaling daily for some time the sewage emanations of 16 samples, one of which was unmixed with any deodorant, and the others were mixed with various deodorants, I always experienced afterwards peculiar symptoms. I should mention that carbolic acid and its preparations, when inhaled, do not produce these symptoms, nor does chlorine, so that I was obliged to attribute them to the putrid sewage effluvia.

The first effect produced upon me seemed to be locally on the throat, I felt a peculiar disagreeable sensation over the whole of the soft palate, and part of the hard palate, and in the nose, which became perceptible after the first effect of the smell had gone off. I feel it difficult to describe this sensation, but it was always of the same character, and seemed to me as if a tolerably lasting effect had been produced on the nerves both of smell and taste.

This occurred, perhaps, in five to 15 minutes, and was attended by a slight increase in the quantity of saliva, and then was followed in about 30 to 50 minutes, or sometimes sooner, by a feeling of nausea, which lasted for several hours. I was never absolutely sick, but several times thought I should be. I could not help believing that the primary effect was on the nerves of the throat, either of special sense or perhaps common sensation, and that the vagus was then affected by an irritation set up in the centre by transmission from the nerves.

In addition to this feeling of nausea there were other symptoms indicating some implication of the system generally; three or four hours after the inhalation there was a feeling of chilliness and then headache and depression, and during the night slight fever, if I may call (in the absence of thermometrical evidence) uncomfortable heat and restlessness by that term.

These symptoms often lasted 20 to 24 hours, and I was so well aware of them that when I had any special work on the following day, I was compelled to omit the experiments for the time.

There was no diarrhœa at any time.

That these symptoms were real is, I think, proved by the following fact. In November I went to London for ten days, and during the time was perfectly free from any symptoms of the kind. On the day after my return to Netley I was very busy, but looked at the sewage samples to see how the deodorants were acting. My thoughts were so much occupied with other matters that I entirely forgot the effect which the sewage emanations had on me; I had left the room for ten minutes, was engaged in other matters, and had ceased to think in any way of the experiments, when I suddenly felt the peculiar disagreeable smell and sensation in the throat, and soon had all the usual symptoms. In this case, as far as I could tell, imagination could have played me no tricks.

It now became a matter of interest to settle the following point. I was inhaling all sorts of sewage emanations; one of the samples which served as a standard of comparison had nothing added, the others had various substances. Would the same effect have been produced if I had inhaled nothing but samples containing carbolic acid?

I subsequently tested the point. From December to March I left off the experiments, and remained entirely free from all the symptoms just noted.

The sewage in October 1867 had been a mixture of solid and liquid sewage. In March I took solid sewage alone, and let it become putrid. The emanations produced the same effect as before, and lasted for 23 hours. I then mixed crystallized carbolic acid, Calvert's and M'Dougall's, in the proportion of 30 grains to 10 fluid ounces of the sewage.

The sewage smell was not entirely destroyed.

The emanations had still some action on me, but in a less degree the symptoms did not last more than two or three hours, and by evening I was quite well, and fit for my ordinary occupations.

I then increased the crystallized acid to 60 grains, and tried the effect. Two hours after addition, the emanations still produced slight symptoms; but two days afterwards, when I tried again, I could not say that any effect was produced, or certainly it was extremely slight; as compared with the symptoms of the previous experiments it was nothing.

I conclude, therefore, that when carbolic acid is added in large amount, it prevents the giving off the effluvia which acted upon me, but that it requires to be in considerable amount to do this effectually.

APPENDIX No. XXXVIII.

A REPORT ON THE WELLS WHICH ARE MADE USE OF BY THE TROOPS AT KANDY,

WITH A CHEMICAL ANALYSIS OF THE WATER OBTAINED FROM EACH.

By Staff Assistant-Surgeon W. R. KYNSEY.

General Description of Station.—Kandy is situated in latitude 7° 18′ N., and longitude 80° 48′ E., at an elevation of 1,678 feet above the level of the sea. It was formerly a place of very great importance, as its ancient name of Maha Nana (or Great City) points out; and it is now the principal town of the central province, and the emporium of the coffee district. The town itself is placed on a peninsula formed by the Mahawelli Ganga, one of the largest and most important rivers in Ceylon, and surrounded by a double fortification of lofty hills, so as to place it in a kind of natural basin. The appearance of the place, when first entered, is most picturesque, containing, however, few objects of interest beyond the Dalada Malagawa, or temple of the tooth, and a few small dagobas, having relics of Buddha beneath them. The streets are narrow, and the buildings small and wretched, occupied, for the most part, by native traders and the burgher population. On the southern side of the town is a large fresh-water lake, entirely of artificial origin, about three-fourths of a mile long, and from 200 to 500 yards wide. On a small promontory on the eastern side is placed the hospital of the European troops, consisting of three irregular-shaped buildings, formerly the zenana of the kings of Kandy. The lake is fed by springs beneath, and small streams which run from the hills above. These, after rain, bring down a large quantity of water and sand; the latter is deposited at the sides, gradually silting them up. The water is used for domestic purposes; the town latrines open into the lake.

The general aspect of the country is bold, rugged, and uneven, giving it a wild appearance. The surrounding hills range from 200 to 700 feet in height. Some are wooded to their summits with trees of different kinds, as the jack and bread-fruit; whereas others are merely covered with the long lemon-grass (*Andropogon schœnanthus*), which affords pasturage for cattle, and serves many other useful purposes.

Geological Formation.—The geological formation consists of primitive crystalline rock, particularly gneiss, with veins or strata of quartz and felspar interspersed. Micose and talcose schists, quartzite, graphic granite, and pegmatite, are also found topping the gnessic hills. Magnetic iron ore is found imbedded in the gneiss. The felspar is easily decomposed, and forms kaolin, or porcelain clay—a composition of silica and clay, which is used as a substitute for lime in whitewashing houses, &c.

Small twelve-sided crystals of garnets (dodicahedrons) occur abundantly in the gneiss. In some places, owing to the catalytic action of magnetic iron, the gneiss is transformed into a substance called laterite, or cabook. Oxide of iron is first produced, which gives the peculiar red colour.

Dolomite, or magnesian salt of lime, is also found in two varieties—a white and a grey; both are studded with minute crystals of mica.

The clays found in the neighbourhood of Kandy are formed from the debris of the primitive rock, the soil being very deficient in vegetable matter, of a light nature, and not naturally fertile. The gravel consists of small pieces of gneiss and quartz. In some of the streams about, small rubies are found, but they are neither large nor valuable.

The wells of Kandy, from which the troops derive their supply, are fourteen in number, and they are fed principally by the rains which fall periodically: Ceylon, like other tropical countries, having a dry and a wet season, the former lasting from December or January until June, and the latter from the end of May until October or November. During the dry season the north-east monsoon prevails, and the south-west during the wet. The following Table gives the rain-fall for the year 1866:—

	Quantity in inches.
January	5·850
February	·475
March	·150
April	·581
May	·063
June	6·890
July	6·870
August	7·120
September	3·250
October	5·680
November	14·078
December	11·650
Total	62·657

The annual rain-fall varies very much in different years. In some, the quantity which falls is very considerable, but in others quite insufficient. In 1866 (last year), during the dry season, there was a great scarcity of water in Kandy, and many of the wells failed to yield any supply.

The accompanying analysis was made during the wet season, of course when there was an abundant supply of water in the wells, so that to form an accurate estimate of the quality, another examination should be made during the dry season; then the mean of the two would give a true result.

In some of the wells the water supply comes from a distance by means of a stream which runs down the side of the hill, as, for instance, at the Royal Engineer Quarters; but in most cases the supply is just beneath the surface. No doubt at the European Hospital, from the proximity of the lake, water percolates into the well; the level is nearly the same in both, and both are influenced alike by the falls of rain.

Remarks on Analysis.—Impurities.—Organic matter exists in all the wells with the exception of No. 2 well, where I was unable to detect the smallest trace of organized matter of any kind. In this one the quantity of chlorides was very small, being only ·22 grains per gallon. This is the water principally used by the European troops.

The origin of the organic matter is both vegetable and animal, but particularly the latter, as shown by the quantity of chlorides, a sure index of animal organic matter in wells at a distance from the sea, and removed from soils containing chloride of sodium in quantity.

Under the microscope, in all the wells, small quantities of vegetable matter were seen. Nitrates, indicating old organic matter, I found present in five of them. I could only estimate the quantity qualitatively, as I had no means of ascertaining the exact amount.

Chlorides.—In some of the wells there was a large quantity of chlorides, particularly in well No. 14, where we have 8·35 grains per gallon, and this evidently arises from defective drainage, the well being situated in low ground, which was formerly the bed of an old lake.

In the well attached to the quarters of the Officer Commanding the European troops, I found 6·78 of chlorides. As the well is close to the latrine, it is but fair to conclude that they gain an entry into the water by percolation.

Earthy Salts.—Under this head the salts of lime and magnesia are included; the quantity is not large in the wells, not reaching more than 9·80 grains in any of them, and in some it falls as low as 1·05 grains per gallon. Carbonic acid exists in nearly all the wells, imparting to them a sparkling character.

Silica exists in nearly all the waters, derived from the decomposition of felspar, and also from the leaves and stem of the bamboo tree, which contain it in considerable quantity. It is satisfactory to see, by this analysis, that the troops have excellent water in the well attached to the prison, about three minutes' walk from their quarters, and, as far as I can learn, they confine themselves to it for drinking purposes.

The analysis has been made strictly in accordance with the directions laid down by Dr. Parkes, of the Army Medical School, and I have endeavoured to make it as accurate as the limited supply of chemicals and chemical apparatus would allow.

Assistant-Surgeon L. A. White, Ceylon Rifle Regiment, jointly performed the analysis, and rendered all the assistance he could in making it complete.

Summary of Analysis.

Table giving an Analysis of Wells of Kandy as to Organic and Inorganic Matter.

1.	Total solids	= 9·00	grains	=	Organic	0.81
					Inorganic	8·19
2.	,,	= 4·00	,,	=	Organic	None.
					Inorganic	4·00
3.	,,	= 12·00	,,	=	Organic	2·52
					Inorganic	9·48
4.	,,	= 16·00	,,	=	Organic	·61
					Inorganic	15·39
5.	,,	= 14·30	,,	=	Organic	1·01
					Inorganic	13·29
6.	,,	= 9·00	,,	=	Organic	·96
					Inorganic	8·04
7.	,,	= 10·00	,,	=	Organic	6·21
					Inorganic	3·79
8.	,,	= 4·20	,,	=	Organic	1·31
					Inorganic	2·89
9.	,,	= 4·05	,,	=	Organic	1·26
					Inorganic	2·79
10.	,,	= 11·10	,,	=	Organic	1·07
					Inorganic	10·03
11.	,,	= 6·00	,,	=	Organic	·47
					Inorganic	5·53
12.	,,	= 9·50	,,	=	Organic	1·10
					Inorganic	8·40
13.	,,	= 16·00	,,	=	Organic	1·80
					Inorganic	14·20
14.	,,	= 13·50	,,	=	Organic	1·66
					Inorganic	11·84

Physical, Chemical, and Microscopical, Examination

[Note.—The following Analysis was made by order of the Principal Medical Officer, Dr.

Number of Well as shown on the Map.	Description of Wells with the Numbers of the Quarters.	Physical Examination.	Reaction and Specific Gravity.	Quali-			
				Organic Matter.	Lime.	Chlorides.	Sulphates.
1	European Military Hospital, situated close to the main road, protected by a brick wall and wooden cover	Clear, colourless, devoid of smell, sparkling, having no deposit, and agreeable to taste	Neutral both before and after boiling. Sp. G.=1000·2	Present in very small quantity	Present in quantity from 3 to 4 grains	Present from 2 to 3 grains	Present in very small quantity
2	The Prison well, situated close to the Military Prison. The sides are formed of brick and stone; top open	Clear, colourless, devoid of smell, agreeable to taste, no deposit	Neutral. Sp. G.=1000·2	...	Present in small quantity	Present in very small quantity	Present in very small quantity
3	This well is attached to No. 33 Quarters, which are generally occupied by the Senior Medical Officer. It is 40 feet deep with an open top	Not quite clear, has no smell, but a slightly disagreeable taste	Neutral. Sp. G.=999·	Present about 1 grain	Present 1 to 2 grains	Present 1 or 2 grains	Present 1 or 2 grains
4	This well is attached to No. 6 Quarters, occupied by the Commandant. It is 20 feet deep, the sides being formed of brick and stone	Clear and transparent, devoid of smell or taste	Neutral. Sp. G.=1000·	A trace only present	Present in pretty large quantity	Present from 4 to 5 grains	Present about 2 grains
5	This well is attached to Quarters No. 5, occupied by the Officer Commanding the European troops. It has brick and stone sides	Clear and transparent, sparkling, devoid of smell, is most agreeable	Neutral. Sp. G.=1000·1	About a grain	Present in pretty large quantity	Present from 4 to 5 grains	Present 1 or 2 grains
6	This is situated between the Quarters numbered 30 and 31. It is an open well, having brick and stone sides	Clear, agreeable, devoid of smell	Neutral. Sp. G.=1000·1	Present from 1 to 2 grains	Present 2 or 3 grains	Present in very small quantity	Present 1 or 2 grains
7	Tank A. The water in this is not used for drinking purposes	Is not clear, having a disagreeable taste, soft and insipid	Neutral. Sp. G.=1000·6	Present in large quantity, 4 or 5 grains	Present from 1 to 2 grains	1 or 2 grains	1 or 2 grains
8	Tank B. Is situated close to the cook-house	Clear and agreeable to taste, no deposit	Neutral. Sp. G.=1000·	In very small quantity	From 1 to 2 grains	In very small quantity	1 or 2 grains
9	This well is situated in the Barrack Compound, shown on plan as No. 9 Well	Clear and agreeable with a slight deposit	Neutral. Sp. G.=999·5	Present from 1 to 2 grains	About 1 grain	In very small quantity	½ grain or so
10	This well is in the Compound of the Royal Artillery Barracks, open, brick and stone sides, close to one of the streets of the town	Clear, devoid of smell and colour, softish taste	Neutral. Sp. G.=1000·5	Present	From 4 to 5 grains	1 or 2 grains	1 or 2 grains

of the Well Water of Kandy, Ceylon.

J. Fraser, C.B., who supplied me with the necessary chemicals and apparatus.—W. R. K.]

tative.			Quantitative.					Microscopical.	Remarks.
Nitrates.	Carbonates	Iron.	Total Solids.	Organic Matter.	Chlorides.	Earthy Salts.	Silica and Waste.		
			Grains pr.gal.	Grains pr.gal.	Grains pr.gal.	Grains pr.gal.	Grains pr.gal.		
	Present in very small quantity	...	9·00	0·81	2·82	4·94	0·43	Deposit shows a very small quantity of vegetable cells, with small portions of cellular tissue	This well yields the best drinking water in Kandy.
	Merely a trace	...	4·00	...	0·22	3·36	0·42	Broken down vegetable tissue, and cells with small portions of woody fibre	The water from this well is used by all the European troops, and also by the inhabitants around.
Present in quantity	...	...	12·00	2·52	2·68	4·96	1·84	Vegetable tissues and minute animalculæ, monads, and rotifers, with small crystals of carbonate of lime ($CaO{\cdot}CO_2$)	The water is not used for drinking purposes, there are several latrines near it, also a stable.
	A trace only	...	16·00	0·61	5·21	9·80	0·38	Crystals of chloride of sodium with vegetable tissue in small quantity	The water is said to be good, but of a very hard quality. The stable and garden refuse is deposited in a hole about 20 feet from the well.
	Present in very small quantity	A trace	14·30	1·01	6·78	6·30	0·21	Some few crystals of carbonate of lime	Within 20 feet of the well is the latrine or old cesspit.
	A trace only	...	9·00	0·96	2·74	4·90	0·40	The deposit shows minute animalculæ, monads, &c., crystals of carbonate of lime, vegetable cells and tissue	No source of contamination near this well.
Present in small quantity	Present in rather large quantity	...	10·00	6·21	1·18	2·05	0·56	A large quantity of vegetable débris	The water is used for washing and domestic purposes.
	A trace only	A trace	4·20	1·31	1·41	1·05	0·43	Nothing to be seen of any consequence	The water is considered very good.
	A trace	,,	4·05	1·26	1·18	1·05	0·56	Some vegetable tissue and cells	Is used for various domestic purposes.
About grain i.	A trace only	A trace	11·10	1·07	1·88	7·70	·45	Vegetable débris	It is situated at the bottom of a hill, the adjacent ground is used as a latrine by the natives.

PHYSICAL, Chemical, and Microscopical, Examination

Number of Well as shown on the Map.	Description of Wells with the Numbers of the Quarters.	Physical Examination.	Reaction and Specific Gravity.	Quali…			
				Organic Matter.	Lime.	Chlorides.	Sulphates.
11	Situated in the Royal Engineer's Yard, open with brick and stone sides. No. 13 Quarters	Clear and free from any smell or peculiar taste	Neutral. Sp. G.=1000·1	Present in pretty large quantity	From 1 to 2 grains	From 1 to 2 grains	...
12	This well is situated in the Compound of Quarters No. 23, open	Clear, transparent, and sparkling, devoid of smell, but of a soft and insipid taste	Neutral. Sp. G.=1000·2	Present in pretty large quantity	From 2 to 3 grains	About a grain	Present in small quantity
13	This well is attached to the Ceylon Rifle Hospital, is not much used	Is not perfectly clear, is of a dull colour, and has an unpleasant taste and smell	Neutral. Sp. G.=999·0	Present in from 2 to 3 grains	Present from 5 to 6 grains	From 5 to 6 grains	From 1 to 2 grains
14	This is near the "Lines" of the Ceylon Rifle Regiment, well is shallow, sides of brick	Is not perfectly clear, dull white colour, slight smell, soft taste	Neutral. Sp. G.=1000·1	From 1 to 2 grains	From 1 to 2 grains	From 11 to 12 grains	From 1 to 2 grains

of the Well Water of Kandy, Ceylon—*continued.*

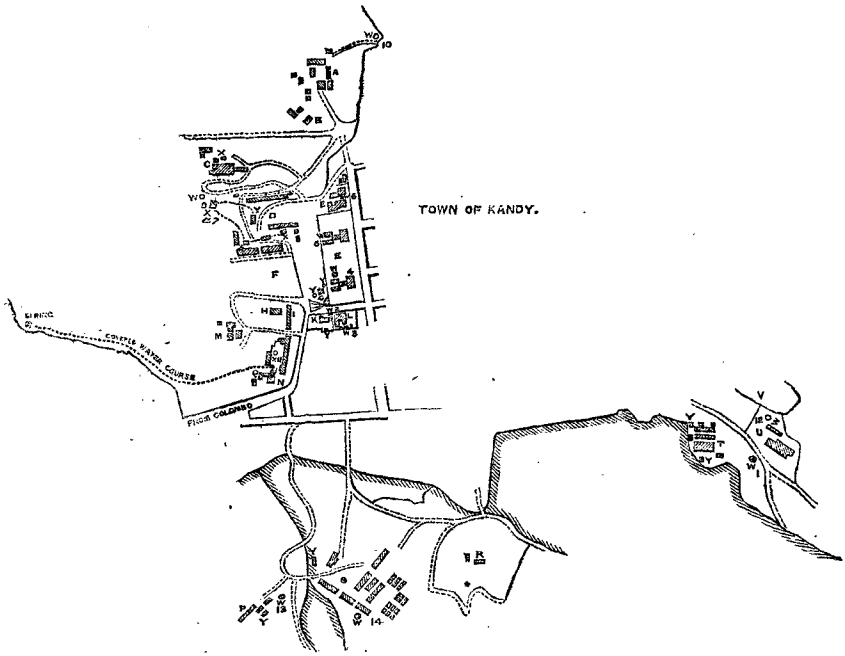
tative.			Quantitative.					Microscopical.	Remarks.
Nitrates.	Carbonates.	Iron.	Total Solids.	Organic Matter.	Chlorides.	Earthy Salts.	Silica and Waste.		
			Grains pr.gal.	Grains pr.gal.	Grains pr.gal.	Grains pr.gal.	Grains pr.gal.		
...	...	...	6·00	0·47	2·86	2·45	0·22	A very small quantity of vegetable tissue	Is considered excellent water.
...	A trace	...	9·50	1·10	2·82	5·25	0·33	Some vegetable cells and woody fibre	This well is placed just beneath the Garrison Burial Ground. The water is considered bad, and is not used for drinking purposes.
Present in small quantity	...	...	16·00	1·80	4·95	7·00	2·25	A large quantity of vegetable débris	It is situated in a ravine where a large quantity of vegetable matter collects, surrounded by trees, the leaves of which falling in decompose.
From 1 to 2 grains	In small quantity	...	13·50	1·66	8·35	3·15	0·34	Minute animalculæ, crystals of chloride of sodium	The ground about is very low, close to the bed of an old lake, which is swampy; the water is used by the troops.

W. R. KYNSEY, *Staff Assistant-Surgeon,*
Now of the Royal Artillery.

CEYLON.

KANDY.

Sketch showing Wells and Water Supply to the Troops.



A. Royal Artillery Barracks.	N. Officers' Quarters, R.E.
B. Officers' Quarters, No. 2.	O. Royal Engineers' Yard.
C. Major-General's Quarters.	P. Ceylon Rifle Hospital.
D. Europeans' Barracks.	Q. " Barracks.
E. Officers' Quarters.	R. Castle Hill.
F. Parade.	S. Lake.
G. Guard Room.	T. European Hospital.
H. Canteen.	U. Officers' Quarters, No. 23
I. Royal Engineers' Clerks' Office.	V. Burial Ground.
K. Provost.	W. Wells.
L. Officers' Quarters, No. 33.	X. Tanks.
M. " " " 8.	Y. Privies.

Scale of 800 feet to an inch.

APPENDIX No. XXXIX.

ANALYSIS OF THE RED EARTH OR SOIL OF SIERRA LEONE.

By Staff-Assistant-Surgeon J. A. B. Horton, M.D.

The specimen of earth sent home by Dr. Gore had been kept in the Museum of the Royal Victoria Hospital for nearly three years in a closed jar.

1. *Percentage of Water.*—2 grammes of the soil after repeated drying and weighing in a hot-air bath gave the minimum weight at 1·8491 grammes, showing a loss of ·1509 grammes; 100 parts of the soil examined, therefore, contained 7·5450 parts of water.

2. *Substances taken up by Water.*—10 grammes of soil well rubbed in cold water (distilled), and tested with a few drops of dilute nitric acid, and then nitrate of silver, gave a very slight turbidity; treated with hydrochloric acid and a few drops of chloride of barium gave also a very slight turbidity, showing the presence of a trace of chlorine and sulphuric acid; with Nessler's test a brownish precipitate, from ammonia. There was no trace of alumina, iron, lime, or magnesia discovered.

3. *Mechanical Analysis.*—10 grammes of soil.

	Grammes.
Weight of large stones picked out	0·66
,, fine stones, obtained by passing it through a sieve ..	2·66
The remainder dissolved in pure cold water, allowed to subside, poured out, dried, and weighed	5·69
Total	9·01

9·01 grammes deducted from 10 grammes, leaves ·99 grammes, which is the weight of dissolved and finely divided substances.

4. *Examination for Organic and Volatile Matter.*—10 grammes of soil, dissolved in cold water (distilled), and boiled with a few drops of chloride of gold, gave no trace of organic matter. Two grammes incinerated in an earthenware capsule for half an hour, showed during the process a slight decolorization, but no blackening, and by continued incineration regained its former colour. When weighed showed a loss of ·298 grammes, consisting of water and volatile substances; or without water, 7·355 parts of volatile substance in 100 parts of soil.

5. *Substances taken up by Hydrochloric Acid.*—20 centimetres of pure hydrochloric acid were added to 10 grammes of soil and boiled, it effervesced. 50 centimetres of water were then added, and allowed to remain for 40 hours, and then filtered, and the following analysis made:—

(*a*) *Substances dissolved by Hydrochloric Acid.*—A drop of this acid solution treated with the red prussiate of potash, gave an abundant deep blue precipitate, showing the presence of oxide of iron. The whole solution treated with ammonia to neutralization, gave an abundant light brown or greyish precipitate, which, when filtered and repeatedly washed and dried, weighed 2·136 grammes. Macerated in an excess of pure liquor potassæ, the residue washed and dried gave 1·4511 grammes of oxide of iron. The solution boiled with carbonate of ammonia, and an excess of hydrochloric acid produced a precipitate which, when washed and dried, gave ·5817 grammes of alumina.

The ammoniacal solution from which the iron and alumina had been preci-

pitated, treated with oxalate of ammonia, gave a slight precipitate which nearly weighed ·0570 grammes, consisting of oxalate of lime.

(*b*) *Substances undissolved by Hydrochloric Acid.*—The residue, washed repeatedly and dried, weighed 7·1095 grammes. Fused with three times its weight of carbonate of soda, and boiled with dilute hydrochloric acid, it left a residue which, on repeated washing and drying, weighed 4·6260 grammes, consisting of silica. The solution boiled with pure hydrochloric acid and a little zinc, to convert the peroxide of iron into protoxide, gave an abundant precipitate when ammonia was added, of oxide of iron and alumina, which, when washed and dried and treated with caustic potash, left a residue that gave, when washed, dried, and weighed, 1·5676 grammes of oxide of iron, the remaining constituent being ·7342 of alumina, and about ·0923 of lime.

100 parts of the red earth of Sierra Leone, therefore, consisted of:—

Silica	46·260
Oxide of iron	14·511
Peroxide of iron	15·676
Alumina	13·159
Carbonate and sulphate of lime, and ammoniacal salts	1·493
Water	7·545
Waste	1·356
Total	100·000

There was no perceptible trace of organic matter.

APPENDIX No. XL.

REPORT ON THE EPIDEMIC OF CHOLERA IN BENGAL IN 1867.

By Dr. BEATSON, Inspector-General of Hospitals.

Section I. History, &c., of the Epidemic.

DURING the spring and summer of 1867, cholera fell heavily on our British troops in India, the first case occurring in the 94th Regiment on the 22nd of April,* and the last in the 1st Battalion 3rd Buffs on the 25th September.

During the year, and mostly during the five months from April till September, no fewer than 9 officers, 469 non-commissioned officers and privates, 56 women and 83 children (as will be seen by Return A attached to this Report), fell victims to the dire disease.

The points which we have to consider in connection with the origin, progress, and decline of the epidemic may be summarised under the following heads, each of which I requested in a departmental circular, issued in July last to all administrative medical officers of the British force in Bengal, might be duly considered and reported upon :—

1. Whether, prior to the appearance of cholera among the European troops, there had been cases among the native ones, or among the civil population of bazaars and villages?

2. Whether, in that case, the disease appeared to have been communicated by pilgrims from Hurdwar?

3. Whether the persons first attacked had been brought more than others in contact with the natives?

4. Whether the corps first attacked, or the particular barrack in which the earlier cases occurred, was nearer than others to native villages or bazaars; or to any main line of communication along which the Hurdwar pilgrims had to pass?

5. The date of the first appearance and progress of the epidemic to be stated accurately and in detail, as well as the dates of removal of men into camp, and the results which were observed to follow first removal, as well as subsequent changes of encampment.

6. That it should also be mentioned whether the state of the weather was unfavourable in any unusual degree; whether the men who were in camp had their cots with them; and what sanitary arrangements were made to prevent communication with infected villages or population, as well as to maintain a proper standard of health among the troops themselves, by suitable accommodation, conservancy, and proper attention to clothing.

7. That the statistics of the disease, with information as to the modes of treatment found most efficacious, will necessarily form an important part of the information furnished by regimental medical officers.

First then, with reference to the question whether, prior to the appearance of cholera among the European troops, there had been cases of cholera among the native ones, or the civil population, the answer is, that on the 12th day of April cholera made its appearance among the pilgrims congregated at Hurdwar; that numbers of these people, returning to their homes, passed, some

* This is not strictly correct, as it will be seen further on, that the first case of the disease among the British troops occurred in the person of a soldier of the 11th Regiment, who, while absent from his own corps on leave, was seized with cholera at Umballa, on 22nd April, and was admitted, treated, and died in hospital of 94th.—G. S. B.

at first through, and others afterwards close to, the cantonment and city of Umballa, in the former of which two cases of cholera occurred in the persons of European soldiers on the 22nd of April.

From a perusal of the Report by Deputy Inspector-General Dr. Munro, C.B., on the appearance and progress of the disease in the Sirhind Division, it seems very clear that, as regards Umballa, cause and effect are very plainly indicated as having existed between the arrival of the pilgrims from Hurdwar and the appearance of the epidemic in cantonments.

In the case, however, of the first appearance of cholera among the troops at Peshawur and the arrival of pilgrims, the connection is not so apparent, although it seems to me impossible to say that such connection did not exist, for it seems to be established that at least one case of cholera occurred in the city of Peshawur nine days before the occurrence of any case in barracks.

With the knowledge of the fact that large bodies of pilgrims had began to reach Peshawur as far back as the end of April or beginning of May, and that those for Jellalabad passed by Peshawur on the 19th of May, it is not easy to reconcile the opinion which appears to have been entertained by the late Deputy Inspector-General Dr. Macintyre, that at the time of the outbreak of the disease in the 42nd Highlanders, that is on the 20th of May, there had not been a case of cholera within 120 miles of Peshawur. It is now known that there was a case in Peshawur itself on the 11th of May, a fact which was not known to the authorities at the time of Dr. Macintyre's lamented death.

The opinion or statement should therefore more properly have been, that, as far as was known to the authorities at Peshawur, there had not been among the pilgrims who had arrived in the vicinity any cases of the disease during their journey from Hurdwar.

It seems, however, most improbable, from what we know of the health and condition of the returning masses on their way to and on their reaching Umballa, Kalka, and even Lahore, that the Peshawur party should have had any complete immunity from serious disease—that they alone, of all the groups returning from the fair, should have been free from sickness.

It is of course quite possible that before they reached Peshawur, crossing, as they had to do, five large rivers, and, as was enjoined upon them, bathing and washing their clothes in each, the disease may have disappeared from among them; but it is also not only possible, but highly probable, that its seeds may have adhered to the persons or clothes of some of the individuals in the numerous groups who travelled along the road from Lodiana, especially when we recollect that in the month of April these groups would walk over the bridges of boats across the several rivers as on the highway.

I am only expressing an opinion as to the possibility of these returning masses of people having in some degree assisted in the development of the epidemic at Peshawur. I am not trying to make it appear probable that their temporary presence really did exercise much influence. On the contrary, I myself incline to the belief that, as regards Peshawur, the epidemic was of local origin, and that its occurrence was connected (as was the first appearance of the disease at Hurdwar) with the atmospheric commotion caused by a heavy dust-storm.

With regard to the other localities where the disease prevailed, Rohilcund, Lahore, and Allahabad (for Oudh escaped in a very great degree), there may have been, as regards the two former, some connection between the appearance of cholera and the passage of the pilgrims, but their relation to each other was not very clear or direct.

As regards Rohilcund, Deputy Inspector-General Dr. Innes, C.B., remarks, "The earliest detail of the appearance of cholera in this district of India, for the present year, is to be found in a letter addressed to the Chief Commissioner of the province by Mr. Reid, Conservator of Forests. He says, 'During the first week in January, Sir Jung Bahadoor's camp, with about 5,000 men, reached Buremdeo, situated immediately under the hills where the Surdah flows into the plains (and the river at this point constitutes the boundary between Nepaul and Kamaon), and previously to this cholera had made its appearance to the west of the Surdah. The disease appears to have proceeded due east from Koshapoor, where I am informed the first symptoms became known at Ramnugger, Kaleedongee, Huldwarree, and as far as Buremdeo.'

"It appears to have caused some anxiety to the authorities, and intimation was at once sent to Sir Jung Bahahoor's camp, on its arrival at Buremdeo, of the existence of the disease to the west of the Surdah; and the advisability of preventing any communication with the inhabitants in our provinces and the people of his camp was suggested, with a hope that such a measure would save the latter. This apparently was found impracticable, as Sir Jung Bahadoor had come thus far to marry one of his sons to the daughter of the Rajah of Kosheepoor, and communication was of course at once opened between the inhabitants of the two provinces; but whether this caused the disease to spread to Sir Jung Bahadoor's camp I am unable to say. It appears conclusive that the disease was travelling as nearly due east as possible, for Sir Jung Bahadoor's camp marched along the foot of the hills from Surgowlie due west, without any apparent symptoms of sickness, but immediately on its arrival at Buremdeo several fatal cases at once occurred.

"It appears that as soon as Sir Jung was convinced of the fact that cholera was in his camp, he marched back from Ducknea Baugh almost by the same route he had come; but although the marches were of considerable length, yet the disease remained in the camp, and it has been estimated that the casualties numbered nearly 600, in what period, however, is not mentioned."

Dr. Innes goes on to add, "In the first week in April, cholera appeared at the native fair of Dabee Patan, in the Foolseepoor district, and near the foot of the hills. Twenty cases of the disease showed themselves almost simultaneously, and the gathering at once dispersed. This thinly-populated district became afterwards a focus of the disease, 1,474 deaths having occurred between Balsampoor and Foolsteepoor alone. Southward from thence it seems to have spread over the Goudah and Baraitch districts, becoming nowhere severe until the last week in April, at which time it showed itself at Fyzabad, appearing in the cantonment of that station on the 27th of April.

"But there is not wanting evidence to show that during the months of February and March, cholera was very prevalent all along the Himalayan Terai, skirting the northern districts of Luckempoor, Baraitch, Goudah, and Gurruckpore. It seems to have remained stationary in the villages of this tract, extending slowly and only becoming virulent in the plains to the southward towards the end of May."

"I have endeavoured, from the reports of the civil officers of Government, kindly placed at my disposal by the Chief Commissioner, to ascertain, as nearly as possible, the dates on which the disease first showed itself in the several districts of this province. The records, however, are so imperfect that I appealed to the civil medical officers in the several districts for answers to a series of questions, and their replies will be found appended to this (Dr. Innes') Report. An examination of these will show that principally during the months of April, May, June, July, and August, the disease appeared to have arisen from an endemic source in many districts almost simultaneously, and that the influence of the pilgrims in assisting in its spread was very slight indeed."

Further on, Dr. Innes remarks, "At Lucknow, the outbreak amongst the troops in the month of August did not amount to an epidemic invasion. Cholera had long been rife in the native town, but early in August it rapidly subsided. It was after the date of this subsidence that the troops first became affected. In Her Majesty's 55th Regiment there were four cases, the first appearing on the 9th of August, the last on the 24th September."

In the town or city of Lucknow the first cases were clearly sporadic, the disease having simultaneously shown itself in two institutions, the inmates of which were of necessity much isolated, and therefore specially removed from the sources of infection, viz., the civil gaol and the lunatic asylum. These cases occurred as far back as the 27th of March, and on the 3rd of April other two cases were reported in the last named of these, and on the 8th three more in the first.

Notwithstanding these very clear indications of the existence of cholera from endemic causes, even prior to the appearance of the disease at Hurdwar, Dr. Innes remarks, and I think very justly, "It would nevertheless be absurd to deny that the flood of tainted pilgrims returning from the Hurdwar fair was not also an important element in the propagation of the disease. Hurdwar, where nearly 3,000,000 of human beings were congregated, offered

a nidus for its development, and although but little of a marked epidemic broke out in the place itself, so soon as the masses began to disperse in diverging streams, cholera showed itself. The frightened crowd pressed homewards by daily marches of from 20 to 30 miles, poor, ill-fed, and badly clothed, footsore and weary; they were in a condition most fit to become its victims. By the wayside their path was marked by death, due as often to simple exhaustion as to diarrhœa, which so commonly follows it; and a wild terror was spread amongst the villages past which they hurried."

With regard to the first appearance of the disease at Mean Meer (Lahore) the divisional authorities were of opinion that its appearance was connected with the arrival of the pilgrims; and Dr. Jephson, in his report, states that the first case was said to have occurred at Umritsur the day after some pilgrims had arrived, about the middle of April. This date, if correct, would only give about three days, or 72 hours, between the appearance of the disease at Hurdwar, and the occurrence of a case at Umritsur; there could therefore be no relation of cause and effect between the two occurrences. It is, however, different as regards the relative dates of the arrival and passage of pilgrims, and the occurrence of the first case of cholera at Mean Meer, on the 26th of May. Long prior to this latter date, the pilgrims who had left Hurdwar, after the appearance of the epidemic, had reached and passed Lahore, as they had arrived at Peshawur on the 19th of May. Those which are said to have reached Peshawur on 28th of April must have left Hurdwar before the 12th, except in the case of a few who were able to travel by dâk gharries.

Although therefore in the Lahore Division report, the connection between the passage of the pilgrims and the appearance of cholera is not very definitively touched upon, but is merely alluded to in a general way as the probable cause of the appearance of the disease, I think we may accept the opinion that there was some connection between the two events as extremely probable.

In the Morar (Gwalior) district, the total number of cases of cholera among the British troops amounted only to 19, and any immediate connection between the appearance of the first cases and the advent of pilgrims is not shown in the report for that circle. Indeed it is quite probable that the disease may have had on this occasion an endemic origin, as this station (Morar) has more than once suffered from very severe visitations, and the same may be said of its appearance at Allahabad, where it was not so severe on this occasion as it has been on many previous ones—in fact, the disease has very frequently of late years appeared at Allahabad on the setting in of, and during, the rains.

In the case of Meerut, where the disease struck heaviest of all, it did not appear till towards the end of August, four months after it had appeared at Umballa, and three months later than it did at Peshawur.

The second point of inquiry has been replied to above, but we may further observe that at the time of the appearance of cholera at Hurdwar, the north-west provinces were ordinarily healthy, and generally free from epidemic disease, although a good many cases of cholera had occurred in the preceding November among the troops and levies (among the latter to some extent) assembled for the great durbar at Agra; and subsequently, cholera, as has been shown, prevailed extensively among the villages in the Terai, at the foot of the Himalayas, especially at the foot of the Nynee Tal hills.

The third point cannot be replied to very definitely, but with reference to it, and to the query in the fourth heading, Dr. Munro remarks in his report as follows:—"On the 19th of April (four days after the pilgrims had began to arrive in the vicinity of Umballa) the first case of cholera occurred in the Umballa cantonment. A woman (a prostitute) living in the 94th Regimental Bazaar, which bazaar is within 50 yards of the Grand Trunk Road, was seized with cholera, and died after an illness of 5½ hours. It could not be ascertained whether any pilgrims had been in communication with this woman, although careful inquiry was made at the time."

On the 20th, another death from cholera occurred in this bazaar, but in a different part of it, and on the 21st another case.

A native doctor, with a supply of medicine, was immediately attached to

the bazaar, and white-washing and other sanitary measures put in operation.

On the 22nd, two European soldiers were seized with cholera; one, a man of the 11th Regiment, was on his way down country from the Lawrence Asylum, at Sanawur. This man had crossed the line of pilgrims the day before his illness. The second man belonged to the 94th, and had been in the company of the first man the whole of the day before that on which he was taken ill. These two cases were treated and died in the 94th hospital, the first proving fatal in 14 hours, the second in 8½ hours.

On the morning of the 23rd of April, 20 cases of cholera were reported as having occurred in 94th Bazaar. The bazaar was accordingly at once vacated, and the inhabitants turned out into camp. Hospital sheds were erected in their camp, and a native doctor, with a supply of medicine, told off to attend to the sick.

At 2 P.M. on the 23rd of April, an officer of the 94th Regiment (Lieutenant Mercer), and the wife of a soldier of the corps were taken ill of cholera; and about the same time the Surgeon of the regiment was attacked, and although he recovered, was not again fit for any duty, and had to be invalided to England at an early period of his convalescence, his recovery having been very unsatisfactory.

Up till this date, 23rd of April, the disease was entirely confined to the bazaar and barracks of 94th, which are quite close to the Grand Trunk Road, along which the pilgrims who had got into Umballa before the *cordon sanitaire* was established, had passed.

It is clearly with regard to Umballa that we can the more easily trace the connection between the advent of the pilgrims and the appearance of cholera in the cantonment. In the direction of Umballa the cholera and panic-stricken crowds from Hurdwar streamed along the road from Saharanpore, and coming almost in one mass to Umballa, they then began to divide and to diverge according as their routes lay north to Kalka and the hills, north-westward towards the Punjab, or southward towards Hissar, Hansi, &c.

We now come to the fifth point of inquiry, which is answered as far as is practicable by the Return B attached to this report. With regard to the state of the weather, there was probably no very appreciable peculiarity, but it will have been noticed that both at Hurdwar and at Peshawur, the appearance of the disease was immediately preceded by severe atmospheric disturbance, a heavy storm of wind and rain at Hurdwar, and of wind and dust at Peshawur. At Morar also, a heavy, close, oppressive state of atmosphere, that condition which so constantly precedes a storm in the tropics, was present when the 103rd marched out of cantonments into camp, on the evening of the 15th of July, on which evening march some 30 seizures and seven deaths occurred from insolation. On the 16th, the weather was still oppressively close, and on the 17th a down pour of rain took place.

With regard to the sanitary arrangements in the camps, I believe everything was most carefully and judiciously attended to. The men always had their cots with them, and the number in each tent at no time exceeded eight. The conservancy generally and latrine arrangements especially were all most carefully attended to, and every attention was paid to the subject of the men's clothing.

Construction of Temporary Barracks for use during Epidemics of Cholera.

Before leaving the subject of the sanitary arrangements of camps, and of the means to be recommended to moderate the evils of excessive heat and of rain in tents, I think it right to allude to a subject touched upon in the Special Report of the epidemic in the Lahore circle, viz., the construction of temporary barracks, some seven or eight buildings, to be maintained around Mean Meer, so that when the necessity for moving out occurrs, the men can move into these temporary barracks instead of into tents.

To such a proposal I consider there are the strongest objections. In the first place, we will suppose a party to be moved out of cantonment barracks into one of the temporary buildings on account of cholera, and that thereby the disease has *not* been checked. The men must after all move into tents, so that the existence of the temporary barracks is of no earthly use.

In the second place, such buildings constructed by means of iron framework, with choppered (grass) sides and roofs, and mud floors, can never be

thoroughly fumigated or purified except by being burned down. This being the case, I do not think it would be justifiable on any subsequent occasion to place men in any one of these buildings in which cases of cholera had occurred during a previous epidemic.

The chief object in moving men out into camp is to be able at any moment to shift ground. Nothing but tents will make this practicable, and therefore I would not recommend any deviation from the use of tents. If the heat in tents is unbearable, or the men are suffering from dampness of ground, &c., I would, after their own barracks had been thoroughly purified, rather try the effect of a move back to cantonments.

Medical treatment of the disease.

We must now approach the not least painful subject for consideration, to wit, the modes of treatment followed during the prevalence of the recent and previous epidemics; and however humiliating may be the confession, I fear it must be made, that, when the disease has passed into the stage of true cholera, our hopes of successful treatment are very indefinite—that is, one man may unexpectedly recover from apparently the more severe and hopeless attack, and another may succumb to symptoms far less severe; but in either case it may be that treatment has had but little to say to either the recovery or the death.

During the stage of collapse the system seems quite unequal to respond to any mode of treatment, and such being the case the less we do the better; at all events, the less active medicines, such as opium, for instance, that we give the better; for if reaction does take place, the effects of the medicine may be rapidly developed, although its exhibition in large and perhaps repeated doses, may have previously been marked by no effect whatever.

When I say that perhaps the less we do in the way of treatment during collapse the better, I mean of course, beyond mitigating by every means in our power the sufferings of the patients.

In the Peshawur reports there is a very general testimony to the inutility, in fact to the injurious subsequent effects, of undue stimulation. This is especially the opinion of Surgeon Holton, of Her Majesty's 77th, an officer of great experience and of close observation.

There can, however, be no great difference of opinion on the expediency of paying early attention to all premonitory symptoms when these are present, which unfortunately they are not always. Indeed it is frequently remarked in the several reports on the recent epidemic, that there was a general absence of the usual premonitary symptoms of the disease, a condition of things which always indicates a very severe type of cholera; at least such has been the result of my observation, many of the worst and most rapidly fatal cases of the disease which I have treated having occurred in men who, within an hour or two of coming to hospital, had been apparently well and at their duty, but who, without any previous sickness or purging, seemed to be suddenly prostrated by the cholera poison, and at once struck down with collapse.

One medical officer, believing "that almost all remedies are rejected from the stomach in true cholera," has no faith in any system of treatment or remedies, and believes that the diarrhœa, which has been caused by the morbific agency of the disease (whatever that may be) is nature's effort to rid herself of the poison, and therefore he condemns making any efforts to stop the purging.

The majority, however, take a different, and I think a safer view, and use every effort to mitigate the profusion of the bowel discharges, trusting to other outlets for the elimination of the poison, two of which outlets doubtless are the stomach and the skin; and to aid the efforts of these organs, I believe that a mustard emetic early in the disease may often be exhibited with great advantage.

More full particulars on the subject of treatment are to be found in the reports of regimental and divisional officers; it is therefore not considered necessary to go into detail in this report, which, even without doing this, is more bulky than I expected or wished it to be. There are, however, two more points to be touched upon, and they must necessarily be so at some length.

Section II. Movement of troops affected with cholera into camp.

The first of these we may, therefore, now take up, viz., what should be done when cholera attacks a station or a regiment, or when it is prevalent

in the vicinity of a cantonment, or is evidently and steadily approaching any place where troops are quartered. Every one, I think, will agree that in such circumstances, preparation should at once be made to move out the force as soon as the necessity for so doing may arise. The decision as to when this absolute necessity is clearly apparent is, however, the not at all times easy problem to be solved. I venture to think it should be solved, as far as practicable, by the military and medical authorities on the spot. No arbitrary definition of what is to constitute epidemic cholera will be an unerring guide. Very many circumstances and facts have to be considered, and can be best considered by those on the spot.

In the first place, there are to be weighed well the probabilities of being able to move the men into, so to speak, a less epidemic locality; for example, if the cantonment which has been attacked, or which is threatened, lies in close vicinity to a large and populous native city, in which cholera is prevailing, or which it is threatening, while the district around is healthy, then a move is expedient and justifiable; but if the disease appears to be quite as prevalent in the district generally as in the immediate vicinity of the barracks, the expediency, I will not say of moving, but of keeping men out under canvas in unfavourable weather, is much less manifest, and we cannot hope for the same satisfactory results from the movement into camp.

In such circumstances, I would certainly move the men out of the affected barrack in which cases of the disease had occurred, and I would keep them out until the barrack had been freely fumigated and thoroughly cleansed, the latter process including whitewashing; but this having been done, I would, unless the disease had, since the move out, attacked other portions of the cantonment, be disposed to move two-thirds of the men back into their barracks, leaving the other third in tents until the effect of the move back into barracks was apparent.

The reason why I would not recommend the return of all the men back at once, is my belief in the great advantage of letting men have increased superficial space, during the prevalence of epidemic disease. Ninety feet of superficial space is very liberal and sufficient for men under ordinary circumstances, but when epidemic disease is present there will be decidedly increased safety in giving each man 135; and I am glad to find that in recent instructions which have been issued by the War Office, for the guidance of officers concerned, during outbreaks of cholera, the expediency of allotting all available barrack space, so as to extend the individual allotment is insisted upon.

In the above expressed opinion on the subject of moving men back into barracks as soon as possible, I need not perhaps remark that this recommendation would be dependent on the circumstances of the camp, and on the season of the year; for if cholera would appear in the cold season, instead of, as it almost always does during the heat and rains, no one would question the advisability of keeping men for an indefinite period under canvas, as in the cold weather in Northern India, there is no such healthy life as that of a camp. But when the encampment has to be carried out in the fiery heat of the Peshawur Valley in the month of June, or during the rains, with the ground damp and flooded in the vicinity of stations like Mean Meer and Meerut; or men have to be placed in tents in the black damp clayey ground around Kamptee, it is of vital moment to decide, first as to the absolute necessity for moving, and secondly, as to the time when the men can safely return.

I know that it may be answered, in fact, it often is, and has been said, that even admitting all the risks of fever, &c., following the exposure, we must in a case like this of two evils, choose the least. This is undoubtedly a just axiom when it is a true one; that is, of two apparently certain evils, every sane man will choose the least; but are the two evils in this case equally certain? Can we always safely predicate that unless men, among whom two or three cases of cholera have occurred, are at once moved into camp, they will be decimated? We cannot do so, but we can say with perfect confidence, that if men are moved under canvas in the hot weather or in the rains, the risk, almost certainty, of loss of health is great; again, we must not say nor think, for we are not justified by past experience in believing so, that in every instance a move into camp will eradicate the disease. For all we know, we

may be moving into a more concentrated stratum of infected atmosphere, as I cannot help thinking may have been the case in the Peshawur Valley last hot season.

With regard, however, to the connection of the outbreak of the disease in Peshawur with the return of the pilgrims, there is, as already remarked, no very satisfactory evidence; indeed, there are reasons for supposing that as at Hurdwar, the development of the disease may have been directly caused by atmospheric commotion, there having been a severe dust storm on the evening of the 19th of May, while cholera appeared early in the morning of the 20th.

On the contagious and communicable theory, however, the danger of crossing or following the paths by which the Jellalabad pilgrims had just before crossed the valley, must have been greater than remaining in cantonments; and it is a fact that repeated moves and changes of position did not get rid of the disease, and that it continued to appear in camp up till the date on which it abated in the city of Peshawur.

Again let us look to the effects of moving into camp Her Majesty's 106th in the vicinity of Mean Meer; the disease did not speedily abate on the men vacating their barracks, quite the contrary; for, although the cases were not extremely virulent, nor at any time very numerous, they continued to occur during nearly all the period the men were in camp; while ever since the return of the regiment into barracks, the men have suffered much from fever, and show unmistakable signs of impaired general health. In saying this, I speak from my own observation, having gone to Mean Meer early in December last, on purpose to see the regiment. Further, what can we say of the effects of moving a cholera-stricken corps into camp, when we look back on the sad history of the 1st Battalion of the Buffs in September last; all we can say is, that however well it may be as a general rule to vacate infected barracks, we cannot calculate on invariable improvement by putting the men in camp. Perhaps it may be said or thought that the arrangements for the camping out of the Buffs were not as judicious as they might have been. There can be no more unfounded supposition; I have had the fullest evidence to the contrary, and from previous correspondence as well as more lately from personal communication with the military and medical authorities at Meerut, I feel bound to put on record, that I believe no regiment could have been more earnestly watched or more judiciously handled during its severe trial, than was the Buffs by the Major-General Commanding and the Deputy Inspector-General of Hospitals, British troops, and that not a day passed that General Troup and Dr. Gordon were not together in the cholera-stricken camps.

By means of these daily visits the requirements of the corps, or any changes required in the camps were seen at once; and without any delay of correspondence, the necessary suggestions were made, and, if approved of by the Major-General, were then and there ordered to be carried at once.

In the first instance, as the disease seemed to threaten to strike heavily on the Buffs, they were moved along a road on which no case of cholera had occurred, as far as was, or as is yet known, while it was impossible to observe the same wise precaution in allotting sites for the camps of the Royal Artillery, as along so many of the thoroughfares from and to cantonments, and in so many of the villages around, cases of cholera had undoubtedly occurred. But mark the results; the Artillery with camps pitched in a direction where it was well known there had been cholera, shook off the disease at once, and the men returned to barracks after a five weeks' sojourn in camp in rude health and vigour; while the Buffs came back more than decimated, and severely fever-stricken.

An undoubted difficulty which cannot be overcome in the vicinity of many plain stations in India, in fact, in nearly all, and signally so in the neighbourhood of Mean Meer and Meerut, is the nature of the ground, and the impossibility of finding any locality sufficiently raised to ensure its freedom from excessive dampness. To obviate this difficulty, and to procure more advantageous camping sites, the Sanitary Commission for Bengal proposed to use the railways; there is often no other way of meeting the difficulty; but then, may not the question suggest itself, are we justified in doing this? Under the belief that the disease is communicable and carried by human intercourse from one district to another, every effort is made during its pre-

valence in the neighbourhood, to isolate the military cantonments as much as possible, but if, when a cantonment is affected, we are to run its inhabitants 60 or 80, or a 100 miles by rail into a previously healthy locality, we may be "not strictly doing to others as we would have others do unto us."

All these are very difficult questions to solve, and when in committee with Dr. Murray, Inspector-General of Hospitals, and Major Malleson, the Sanitary Commissioner for Bengal, at Simla in September last, we well considered them in all their bearings, but without being able satisfactorily to ourselves to solve them on all points. We could not, however, abandon the principle of moving the men out of infected buildings, and that, too, without delay. The principle is a sound one, and one which cannot be given up. The Committee (which was assembled under order of Military Department letter 515, of the 29th of August last), however, suggested some modifications of a few of the rules as published by the Sanitary Commission in their pamphlet on the prevention of cholera in Northern India; hoping that the substitution of these modifications would in some degree diminish the present difficulties experienced by divisional military and medical authorities.

The modifications which we proposed are given in full in the document appended to this report as extracted from Sanitary Commissioners proceedings for November 1867.* The modified rule which we propose should be substituted for Rule 479, as it now stands, will, it is hoped, leave more authority in the hands of the divisional officers; and for the proposed modification of Rule 481 will make more plain what is to be understood by the "body of men" in whom the disease may appear. This is clearly defined and specified in the amended rule to be "the men occupying the barrack in which cholera has appeared in an epidemic form."

Again, the formation of a preliminary camp will remove many of the strongest reasons for not moving men in the afternoon, although my own opinion is decidedly in favour of a morning move. However, as my colleagues in the committee seemed to consider that in some cases rapid action might be of importance, I did not deem it advisable to hesitate in agreeing to the recommendation which they, as well as I would object to, save in the understanding that a preliminary camp is ready, and everything prepared for the men to move into it.

In no case, except when a preliminary camp has been prepared beforehand, would I recommend the men to be moved, save in the early morning, and I cannot give better or stronger reasons for this opinion than those given by Deputy Inspector-General Dr. Munro, C.B. I would add that I hold it to be of great importance in such circumstances not to appear to do anything in too great a hurry; any indication of undue anxiety on the part of higher authorities, will in all probability be noticed by the men, who in such circumstances are very observant, and if they see others unduly anxious, are not unlikely to become unduly so themselves; in fact, to become panic-stricken.

In quoting Dr. Munro's remarks, I may say that I do so with all the more confidence, as he is an officer of great judgment and observation, and one who has had severe experience in the management of a cholera-stricken camp. He remarks as follows in his special report of the appearance and outbreak of cholera in the Sirhind Division in April last.

"In former years I had acquired some experience in moving a regiment stricken with cholera, and I came to the conclusion that any movement made at night was invariably followed by the occurrence of a greater number of cases of cholera and diarrhœa than when those movements were made in the early morning. I give the following explanation:—Men commence their march in the evening, when the heat of the day is scarcely over; as they march, they become warm, but the temperature of the air is gradually lowering, and when they arrive at the new camp-ground they have to wait about for their tents; many throwing themselves on the ground, become chilled, and cases of cholera and diarrhœa follow, the cases of diarrhœa often passing into cholera. Such was my experience as Surgeon of the 93rd Highlanders.

"By moving in the early morning the men have been refreshed by sleep, the temperature gradually rises as they march, and the men escape being

* See Addendum, page 349.

chilled, although they run the risk of being exposed for a couple of hours to the morning sun. This exposure to sun I consider a far less evil than being chilled at night.

"I consider the rule to adopt is to form the camp or camps first, and then to march the parties out in the morning, their cots and baggage accompanying them. The distance should be short, if possible; and hot coffee or tea (not rum) should be ready for the men on the new ground. This was the plan proposed by me in 1862, and followed by my Commanding Officer; and the same arrangement was lately ordered by Major-General Becher, in the case of the 90th, and was carried out by the Officer Commanding that corps."

Dr. Munro further gives expression to the same sentiments which I hold about not appearing to do anything in too great a hurry. He says, "I consider it most injudicious, when it is deemed necessary to move a regiment for cholera, to do things in too great a hurry; for confusion follows, the men get excited and alarmed, and nothing, in my opinion, is more unfortunate than the least approach to panic in times of epidemic visitation."

The modification proposed in Rule 492 will, it is also hoped, while securing thorough purification, not involve an unnecessary delay in having the infected barrack again ready for occupation.

I may add that it seemed to the Committee to be a matter of vital importance that all the recognised encamping-grounds should be planted with shady trees, in order to moderate the fiery rays of an Indian summer sun. In the event of the first move into camp being successful in checking the progress of the disease, or in the event of its appearance being confined to a portion of the corps, it will be a great advantage and comfort to have four or five well-selected and shady spots on which to encamp the men who have been moved out of barracks.

Section III. The necessity for more hill stations for reigments in India, more especially in Bengal.

We will now approach a most important question having reference to outbreaks of cholera, and to the most likely means of saving the frequently recurring and awful loss of life resulting from these epidemic visitations among our British troops in India.

The question is this: has everything been done, or is everything which we can do being done, by which, humanly speaking, these dire visitations may be averted, and our invaluable British soldiers saved, in some degree, from such appalling mortality as that which has occurred during the past as well as on many previous occasions?

My reply to this question is, that I cannot in honesty hesitate one moment in stating, as my firm and mature conviction, that although something has been done, and more is now being done, *a great deal more still remains to be done in the right direction.*

In answer to this I will doubtless be told to look at the results of improved sanitation, and of the improvements in hygiene generally, as shown in the reduction of the annual death-rates among the British force in this country, from 69 to about 20 per 1,000. All this is very plausible, but it is not *satisfactorily convincing*, in so far that—independent of the circumstances of largely increased invaliding, limited service, and much shorter periods of Indian sojourn, circumstances which all markedly affect the death-rate—it is not difficult to show (I grieve to say it will be shown by the returns for 1867) that the mortality is still on a sliding scale, varying just in proportion to the presence or absence of epidemic disease in the shape of cholera, fever, dysentery, or insolation.

Although, therefore, from a perusal of some of the Reports of Sanitary Commissions, people who have no means of judging for themselves may be led to infer that, under enlightened and energetic sanitation, cholera and other kindred diseases may be banished from our Indian cantonments altogether, I am not one of those who can contemplate or expect such happy immunity in the plains of India.

The great sanitary conference which was lately assembled at Constantinople sought, by the bringing forward of many apparently strong facts, to establish that cholera, starting from an endemic nidus (the locality being somewhere in Bengal), spreads solely by means of communication or contact: in other words, by human intercourse from its central starting-point.

I have no doubt in my own mind that cholera not only can be, but that it

often is, directly imported by communication with infected spots or individuals into localities previously healthy; but at the same time I would observe, as has been done by Dr. Sutherland in his Report on the Epidemic Cholera at Malta and Gozo in 1865, that we must not mistake what may be but coincidence for effects, a result which can only be guarded against by adopting a returnal and systematic mode of inquiry.

For my own part, while fully admitting the communicability of cholera, I am not satisfied that the disease cannot, in fact I believe it often does, develop itself independently of all direct and recent communication with infected centres. While, therefore, I would advocate the stoppage of all *un*necessary communication with infected places or individuals, I must express my conviction that, independet of all human efforts, cholera will appear at all events in the plains of India, under certain favouring conditions and circumstances, quite independent of fresh importation from without.

Further, I am also satisfied, if cholera finds its way into any locality from without, or if independent of external agencies it springs up, if I may so say, spontaneously, that its ravages will, as an almost certain rule, be in proportion to the *in*sanitary conditions it meets with in the locality which it attacks. Hence, with this belief, I need not say that I attach as much importance as any one can do to every effort being made to remove every appreciable *in*sanitary condition.*

As evidence of what, for want of a more precise term, I would designate spontaneous cases of cholera, every medical officer of experience in the tropics must be able to recall cases of cholera which have occurred at times, and under circumstances when and in which it would have been utterly hopeless to have tried to connect them with contagion or to attribute them to contact, in some way, with the supposed specific germs of the disease.

It is perhaps not necessary here to raise the question, whether or not cholera always does spring, and only can spring, from specific morbid germs. All that is practically essential to establish is, that cholera most undoubtedly can and does not unfrequently make its appearance at places in the plains of India, as well as elsewhere, without such appearance having been preceded, within any reasonably recent period, by communication with infected localities, that is, with places where the disease has been recently prevailing.

But, even supposing that we adopt the theory of a specific cholera poison, it does not appear to me to practically affect the question; for if we adopt this theory we must certainly at the same time, at least as far as India is concerned, admit that the specific germs or seeds of the disease can for an *indefinite* period remain in a state of complete inactivity; and then, under certain favouring conditions and circumstances, suddenly germinate and burst forth into epidemic vitality.

Without this admission I do not see how the appearance of the disease can, on the specific theory, be on many occasions accounted for. On this theory of a specific origin, therefore, just as much as on that which would ascribe to cholera a less specific producing cause, every spot on which cholera has once appeared may continue for an indefinite period to contain, within itself, the elements of a fresh outbreak of the disease. In other words, such places may at any time, under certain favouring conditions, become the scene of an epidemic, without any fresh importation of the cholera-poison.

Again, many experienced medical authorities see in cholera, malarious fevers, dysentery, and diarrhœa, indications of a similarity of cause, as shown by a certain similarity of symptoms, as well as from the fact that all these diseases not only often occur contemporaneously, but seem often to pass on from one to the other in succession, as if they were really the modified products of one exciting cause, varying in intensity and force.

Some presumptive proofs of the correctness of this opinion are brought forward by Dr. Sutherland in his report, above alluded to. In that paper he endeavours to show how unsatisfactory was the state of the public health in Malta and Gozo for months before cholera appeared—in fact before the disease

* In our efforts to ensure the salubrity of any locality, I perhaps need scarcely observe that effective drainage, and (as far as practicable) the cultivation of all grounds likely to give out malarious emanations, claim the very first consideration.—G. S B.

had shown itself even in Mecca; that the mortality from gastro enteritis, always great in those islands, had risen, in six months preceding the appearance of the first case of cholera, to an annual rate of 60 per 1,000, which was about double the rate of very unhealthy years—in fact more than double, for the six months from January to June do not embrace that period when bowel affections are most prevalent and most severe.

Dr. Sutherland goes on to state that a sudden outburst occurred of a suspicious disease, the symptoms of which were so severe that the first cases were reported to be cases of true cholera, which, however, they were not. This outbreak took place on May 17; and from a full consideration of its character, and of the previous prevalence of bowel affections, Dr. Sutherland comes to the conclusion that long before the appearance of true cholera at Malta, probably before the appearance of the disease in Arabia, the first wave of the coming epidemic had passed over Malta; and from a comparison of the dates of the arrival of the several vessels from Alexandria in June, and that of the occurrence of the first case of true cholera at Malta (June 20), he comes to the further conclusion that that case was an indigenous one, and not the result of imported infection.

These conclusions may be justly deducible from the facts ascertained with regard to the first appearance of the disease in Malta; but it seems to me that the grounds of these conclusions are scarcely strong enough to materially shake the now very general belief in the communicability of cholera, and in the probability that it not only can be, but that it frequently is, imported into perfectly healthy localities by the arrival of individuals labouring under the disease, or coming (without being themselves the subject of actual disease) from infected localities, or that its germs are conveyed by the effects of individuals who have died from cholera.

That the disease can be imported into localities previously quite healthy I have myself no doubt, and that it can extend itself in such localities without any marked disturbance in the health rate of the place, I feel also quite certain, although it is to be expected, if there be any epidemic constitution of season present, or any state of health below the normal standard, and that the ravages of an epidemic will be more severe.

One marked instance out of many, in proof of what I have said, occurred in the Madras Presidency, in January 1861. A party of the King's Dragoon Guards left Madras for Bangalore in that month. Two-thirds of the journey was performed by rail in 10 or 12 hours, the remaining one-third by route march. The men of the party had lately landed from China, had been for a week or ten days encamped on the esplanade between the fort and black town of Madras, and (it being the cold season of the year) many of them had been wandering through the town at all hours of the day, and probably not observing teetotalism. However, while at Madras they escaped sickness of any kind, although cholera may be considered to be endemic there; but when three marches from Bangalore, and four days from Madras, the first case of cholera occurred in the detachment, and although the party were, on arrival at Bangalore two days afterwards, encamped quite clear of cantonments, and placed under a certain amount of quarantine until the disease had quite disappeared from among them,* cases of cholera began to show themselves in the station, and the disease continued to prevail in Bangalore for some weeks, although up to the date of the arrival of the above detachment the station was perfectly healthy.

I may further add that the road to Bangalore, along which the detachment passed, was at the time quite healthy. I myself passed along the same road close behind the party, arriving at Bangalore the day after they did.

Again we may instance the occurrence of last spring in connection with the dispersion of the pilgrims from Hurdwar. That the passage of these pilgrims through the upper provinces of India, and in close proximity to many principal stations, had, at all events at Umballa, a direct influence in the production of cholera among our troops, it seems almost impossible to question, although I am quite disposed to think that the continuance and

* At this date I cannot recollect how many cases of cholera, and how many deaths, actually occurred in this detachment.

severity of the disease showed that there was present an epidemic constitution of season. In fact, the very circumstances attending the first appearance of cholera at Hurdwar, point to the sudden development there of some producing cause, quite independent of importation from without.

The preliminary sanitary arrangements at Hurdwar have been reported to have been in every respect most perfect, and it is quite established that during the presence of the crowded masses of people assembled in the bathing place, every sanitary precaution was taken, and the utmost attention paid to the conservancy establishment. Notwithstanding all this, it is but too clear that the occurrence of epidemic disease was among such a mass of human beings, congregated on the plains of India, simply a question of time; and I must fully believe that it always will be but a question of time whenever crowds of unwashed, ill-fed natives, prostrated by fatigue and long journeys, and subjected to, as well as unprotected from, the sudden alternations of an Indian climate, are congregated on one spot.

The circumstances of the diffusion of the disease from Hurdwar, and of its first appearance there, seem to me to establish pretty clearly two facts; one is, that the disease can spread from an infected centre; and a second, that it is quite capable of originating, in the plains of India, without any specific cause; for it is yet unproved that a single case of cholera or of choleraic diarrhœa was imported into that vast assemblage; while it has been clearly shown that, after certain atmospheric changes and commotions, accompanied by a heavy fall of rain, with cold nights and a cold cutting east wind, cases of the disease began rapidly to occur; and but for the quick dispersion of the crowd, would in all probability have speedily devastated the mass to an extent and with a rapidity which nothing but a belief, not in a specific cause, but in a rapidly developed epidemic agency could satisfactorily explain.

While, therefore, we may hope by certain quarantine measures to prevent in some cases the importation of cholera into our stations; and by careful attention to sanitation, and to hygienic measures generally, to mitigate its ravages when it does appear; I do not believe that we can by any human means or knowledge, at all times prevent the spontaneous occurrence of the disease in the plains of India, when certain conditions of temperature, of atmosphere and of body predispose thereto. What these precise conditions are, although undoubtedly moisture is an active agent, we have but little definite knowledge, and even if we had that knowledge, we would in all probability have over them but little control.

If, therefore, it be the case that we cannot under any degree of isolation, or of improved sanitation, secure our troops from cholera in the plains, what measures are we to take to prevent, as far as possible, the not unfrequent and appalling loss of life which takes place from this and other scourges of an Indian climate? The only answer which I can give, is to keep as few British soldiers as possible in the plains; that is, not to keep a man more than is absolutely necessary for the safe keeping of acknowledged important posts; and for the protection of all our arsenals, which latter duty should never, of course, be entrusted to any other class.

That little more than one-half the number who are now worn down by tropical heat and disease would amply suffice for these purposes might, I believe, be very easily shown; for it is to be remembered that men when sent to the hills are not sent out of the country, but would be always available in high health and efficiency, at a moment's notice, and that with well selected hill sites they could at any time be in the plains in a few days. Could not the native army and the quasi military ponce who swarm at every ordinary station hold command of it for a few days? If they cannot be trusted to this extent of what use are they? and if they can be trusted, as I believe they might be, then the only argument for keeping so many English soldiers in uncongenial and more or less fatal climates, is answered and disposed of.

It will not suffice, however, to adopt any half measures; such, for instance, as were recommended by the late Sanitary Commission for Bengal, three years ago, viz., to send the weakly men of corps to form depôt battalions in the hills. I endeavoured to show at the time that such a proposal was inju-

dicious, and that to carry it out would be objectionable, no less on sanitary than on military grounds.

In my reply to the recommendations of the Commission, I ventured to record that it then was, and, I may now say, it still is, my decided opinion (often enough and very plainly expressed during the last five years) that nothing short of hill accommodation for at least one-third of the British force in Bengal will keep that force in good health and in thorough military efficiency. Every regiment, I conceive, should spend the first two years of its Indian service in the hills, and afterwards two years in the mountains after every four years in the plains. With such an arrangement every regiment landing in India might pass through its ten years of Indian service without becoming seriously impaired in health, and at the period of its relief would go home an efficient body of men who would look back with pleasure, or, at all events, with some degree of satisfaction, instead of with feelings of an opposite character, on its Indian career.

No one who has studied the subject believes now-a-days in the old doctrine of acclimatization of the European in the plains of India. Men may be, indeed are, more subject to attacks of acute disease, for the first year or two, after their arrival; and it is on this account that I would have all newly arrived regiments in the hills during the first two years of their service, so that (as I have elsewhere said) they might *fine* down from the plethora of English health, a change of system which would take place without that deterioration which is inseparable from residence on the plains of India; for, do what we will, deterioration is inseparable from such residence. Some men, of course, suffer less than others, but all do suffer; and statistics clearly show that sickness and mortality increase with age and length of service in India, an unanswerable reason why British soldiers should never serve too long at one time in this country; in other words, should never be localized for service in India only.

The above considerations further suggest another question, to wit; is it expedient to carry out, as at present contemplated, very large and expensive improvements in, and to make large additions to the existing barrack accommodation in the plains? I believe there is barrack accommodation enough and to spare in the plains of India, for the number of men who should be permanently stationed there; and that before what exists is added to, the clearest necessity, military and political, should be shown to justify the expenditure.

It is not in the interest of the service or of the soldier to invest large sums in expensive barracks in the plains; in fact, it is often a most serious injury to both, as thereby many a man is exposed to disease and undue risk of life from the unfortunate circumstance of large expenditure having been incurred at this place, and at that, in the erection of military buildings. Take the case of Mean Meer: how many men have been, and I fear still are, doomed to pine and die at that desolate wilderness on account of the money sunk in expensive barracks on its arid but still malarious soil?

Another reason, as I have lately remarked,* why the outlay on barracks should be as small as is compatible with affording men simple but ample accommodation, is the fact that we can never tell how long a station, at first very healthy, will continue so, after masses of men have been for some time congregated on it. Hence one marked advantage of having temporary, but, at the same time, lofty and well raised buildings, affording to each man ample superficial as well as cubic space. All these advantages, however, can be secured, and the buildings still be barracks, not soldiers' palaces.

Calcutta, February 17, 1868.

* Report on Saidon Bowlie, as called for by Government in the Military Department, in December last.

ADDENDUM.

"THE undersigned, after consideration and discussion, have arrived at the conclusion that, whilst the rules in question are generally decidedly good and judicious, they require in some points to be modified and added to.

"On the subject of the movement of European troops into camp on the appearance of epidemic cholera, the undersigned believe that the two following rules may be advantageously substituted for rules 479 and 481 respectively.

"479. It must be distinctly understood that it is only upon the grounds which we have now stated that the question of the necessity for the removal of men into camp can be discussed. If it be admitted by the Principal Medical Officer that there is reason for apprehending an epidemic outbreak, no option will remain, the men among whom cholera has appeared must immediately be sent into camp. This must be laid down as a positive standing order, under which no choice of action exists, which must be carried out under all circumstances, whatever be the state of the weather, or whatever other objections may be made. Further, to obviate the possibility of this most important measure being improperly delayed by any peculiar views regarding the epidemic character of the disease, it must be ordered that on the appearance of a second case of cholera in a regiment or battery, within one week the Regimental Surgeon shall report the circumstance to the Deputy Inspector-General of Hospitals; this officer will at once examine the case, and upon him will rest the responsibility of recommending to the military authorities the preparation of the preliminary camp, and the provision of carriage to move the troops. On the appearance of a third case of cholera within the week, on the Deputy Inspector-General will rest the responsibility of recommending the removal of the troops at once, or of delaying the movement till the fourth case, when it shall be considered that the disease has assumed an epidemic form, and the men must be removed accordingly.

If Cholera appear epidemically those among whom the disease has shown itself to go into camp.

"481. All, therefore, that need be laid down as an invariable rule is, that the particular body of men among whom cholera has appeared in an epidemic form, must be removed from the locality. For instance, the men occupying the barrack in which the last case of cholera appeared should be removed in the afternoon to the preliminary camp, and as fresh cases appear the barracks affected should in succession be vacated. The sudden appearance of two or more cases in one barrack should cause its being vacated at any season of the year. A whole regiment, or the whole of the troops at the station, need only be sent into camp when it is found that the measures already adopted have not stopped the progress of the disease, or there is reason to fear that they will be insufficient. In no case must the troops be moved from the barracks till the preliminary camp is in every respect ready for their reception.

Among whom epidemic cholera appears must be sent into camp.

"The undersigned are of opinion that attention to those modifications, more especially to those which provide for the timely formation of a preliminary camp, and the progressive movement of the troops in the afternoon, will conduce not only to the comfort of the soldier, but to their immunity from disorders consequent upon sudden and needless exposure.

"On the question of the movement into camp of women and children on the occasion of an outbreak of epidemic cholera in their quarters, the undersigned are of opinion that, having regard to the more delicate nature of persons of that class, it would be preferable to cause them to be removed into an empty barrack, whenever such accommodation is available, care being had to subject the barrack in the first instance to a thorough purification. They would therefore recommend that rule 483 be altered as follows:—

483. "The rules that have now been proposed, as well as those which follow, are equally applicable to the women and children if cholera should appear in their quarters, with this modification, however, that in all cases in which an unoccupied barrack may be available, the women and children shall be moved into that instead of into tents; the building having previously been purified in the

Rules applicable to women and children.

manner laid down in rule 492. Should the disease follow the women and children into the barrack, there and then only should they move into camp. Should no barrack be available, they will be moved into tents in the manner prescribed for the men.

"The undersigned are of opinion that the mode of purification laid down in rule 492 may be advantageously modified. They consider that the scraping of the walls and the painting of the wood-work are not only inferior to other remedies which they are prepared to suggest, but that they tend to keep the men out of their barracks for a longer period than is necessary. They would therefore recommend that rule 492 be altered thus:—

"492. When troops are sent into camp, all the buildings occupied by them in cantonments should be thoroughly purified without the least delay. The barracks should be fumigated with closed doors, first with smoke and afterwards with sulphur, the interior walls and punkahs should be whitewashed, the floors thoroughly swept and cleansed, and generally everything possible done for the complete purification of every building. Special care should be devoted to cleansing the latrines, urinaries, and wash-houses. Chemical disinfectants should be freely used. Until the purification of the buildings is completed, the troops should under no circumstances be allowed to re-occupy them.

Purification of barracks.

"On the subject of the formation of a preliminary camp, the undersigned regarding it as a matter of primary importance, would suggest the addition of a rule which should immediately follow the modified rule 481, and might be numbered 482. As by the provisions of this rule, the present rule, 485, would disappear, the present rules, 482, 483, and 484, might be numbered 493, 484, and 485 respectively. The new rule, 482, would read thus:—

"Proposed 482. The preliminary camp should consist of tents for 200 men, and should be formed on a site previously selected and carefully prepared; it should be from two to four miles distant from cantonment, and whenever practicable, should be on the opposite side of the river. The camping-ground should be surrounded by a double row of trees, and trees should be planted on both sides of the streets of the camp. Excreta should be buried outside the outer row of trees. Cots should be previously arranged in the preliminary camp should the movement take place during the rainy season. For this purpose an extra number, equal to 15 per cent. on the regimental strength, with bedding complete, should be always available. The barrack cots should accompany the men on changing ground, and the bedding of those cots in the preliminary camp, which had been used by men attacked in that camp, should be burnt and replaced.

"The part of the preliminary camp on which tents had been pitched, should be ploughed up at the end of the cholera season.

"In consequence of the great progress of railways all over the country since the publication of the rules under consideration, the undersigned have given their attention to the subject as to how and under what circumstances the mode of locomotion may be utilized, for the purpose of moving troops ordered into camp on the occasion of an outbreak of epidemic cholera. They are of opinion that the means afforded by a railway are especially valuable when the country surrounding the station is low, and very much under water in the rains, as at present, or when a more entire change of air from an affected district is required.

"They apprehend that no difficulty presents itself in the employment of railways for this purpose. Arrangements similar to those carried out this year at Umritzur, for conveying the Hurdwar pilgrims to Lahore and Mooltan, could always be employed. On that occasion separate third-class carriages were assigned for the use of the pilgrims, and were attached to the end of the train just before starting.

"For troops a special train might be employed. Carriages with lining and cushions should not be used, but they should be entirely bare of furniture. After use they should be disinfected by flumes of sulphur and carbolic acid. The men should be carefully inspected before starting, and all those suffering from symptoms of cholera detained under observation and treatment in a special hospital. Should the Government approve of the idea, it might be embodied in a separate rule.

"As doubts have arisen as to the proper application of the direction contained in rule 492, that "chemical disinfectants should be freely used," the undersigned suggest that the following be appended as a note to that rule:—

"For this purpose M'Dougall's powder may be employed, or sulphate of iron, the ordinary *kasses* of the bazaar. This should be used in the proportion of five ounces to a pint of water, or it may be thrown in a powdered state into the vessel employed to receive the discharges, and then mixed with them.

(Signed) "G. S. BEATSON, M.D., Inspector-General of Hospitals, and Principal Medical Officer of British Troops in India.

"JOHN MURRAY, M.D., Inspector-General of Hospitals, Upper Provinces.

"G. B. MALLESON, Major, Sanitary Commissioner for Bengal."

RETURN A.

Stations.	Regiments.	Strength.	Character of the Disease.	Officers.		Men.		Women.		Children.		Total.		Remarks.
				Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	
Peshawur	Royal Artillery ..	534	Cholera ..	..	..	62	40	..	..	..	..	62	40	From May 20 to July 29, 1867.
			Choleraic Diarrhœa	..	..	14	5	..	..	..	..	14	5	
	42nd Highlanders ..	765	Cholera ..	2	..	119	68	3	1	5	4	129	73	From May 20 to July 16, 1867.
			Choleraic Diarrhœa	1	1	4	1	..	..	..	..	5	2	
	77th Regiment ..	735	Cholera ..	1	1	74	50	1	1	2	2	78	54	From May 21 to June 27, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Nowshera ..	1st Batt. 19th Regt...	850	Cholera ..	..	..	4	2	..	..	..	..	4	2	From June 19 to June 21, 1867.
			Choleraic Diarrhœa	..	..	1	..	..	..	..	..	1	..	
Attock	European Garrison ..	181	Cholera ..	..	..	..	..	..	..	1	1	1	1	From July 21 to July 29, 1867.
			Choleraic Diarrhœa	..	..	..	..	1	..	..	..	1	..	
Rawul Pindee	Royal Artillery ..	156	Cholera ..	..	..	..	..	..	..	2	1	2	1	From July 1 to July 31, 1867.
			Choleraic Diarrhœa	..	..	..	..	1	..	..	..	1	..	
	88th Regiment ..	842	Cholera ..	..	..	..	..	1	1	5	4	6	5	From July 9 to July 23, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	2	1	2	1	
Camp Nundkote..	Detachmt. 88th Regt..	276	Cholera ..	..	..	2	1	..	..	..	..	2	1	From Aug. 2 to Aug. 18, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Murree	Convalescent Depôt..	266	Cholera ..	2	2	4	1	1	1	2	2	9	6	From June 22 to July 28, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Near Murree ..	Family Camp ..	294	Cholera ..	..	..	1	1	1	1	3	1	5	3	From July 21 to July 29, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Fort Lahore	6th Bty. 22nd Brg. R.A.	72	Cholera ..	..	..	1	1	..	..	1	1	2	2	From July 3 to Sept. 16, 1867.
			Choleraic Diarrhœa	..	..	2	..	..	..	..	..	2	..	
	Detachmt. 38th Regt..	103	Cholera ..	..	..	1	1	..	..	..	..	1	1	August 30, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	

RETURN A.—*cont.*

Stations.	Regiments.	Strength.	Character of the Disease.	Officers.		Men.		Women.		Children.		Total.		Remarks.
				Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	
Mean Meer	Royal Artillery ..	470	Cholera	..	..	8	4	..	..	..	..	8	4	From June 27 to Sept. 2, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
	106th Regiment ..	772	Cholera	1	1	73	47	5	3	1	1	80	52	From May 27 to Aug. 21, 1867.
			Choleraic Diarrhœa	..	..	6	1	1	..	1	1	8	2	
Ferozepore	A Bty. 19th Brg. R.A.	163	Cholera	..	..	6	2	1	1	..	..	7	3	From July 5 to July 9, 1867.
			Choleraic Diarrhœa	..	..	7	..	..	..	..	..	7	..	
	1st Batt. 5th Fusiliers	888	Cholera	..	..	6	6	7	4	3	2	16	12	From June 27 to July 19, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Umritsur ..	Detachmt. 38th Regt.	78	Cholera	..	..	1	1	1	1	..	..	2	2	From Aug. 4 to Sept. 15, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Bhagsoo ..	Convalescent Depôt..	115	Cholera	..	..	1	1	..	..	..	..	1	1	From July 2 to July 4, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Jullunder ..	82nd Regiment ...	820	Cholera	..	..	12	9	1	1	4	3	17	13	From Sept. 4 to Oct. 6, 1867.
			Choleraic Diarrhœa	..	..	..	..	2	2	..	..	2	2	
Umballa ..	A Btty. F Brg. R.H.A.	120	Cholera	..	..	1	1	..	..	..	..	1	1	May 2, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
	21st Hussars.. ..	465	Cholera	..	..	4	2	1	1	..	..	5	3	From May 8 to Sept. 25, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
	94th Regiment ..	722	Cholera	2	1	23	19	2	2	..	..	27	22	From April 21 to June 11, 1867.
			Choleraic Diarrhœa	..	..	2	..	..	..	..	..	2	..	
Kussowlie ..	Convalescent Depôt..	334	Cholera	..	..	1	1	..	..	..	..	1	1	July 12, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Subathoo..	90th Regiment ..	757	Cholera	..	..	28	19	5	1	10	8	43	28	From April 22 to Sept. 18, 1867.
			Choleraic Diarrhœa	1	..	11	..	3	..	1	..	13	..	

RETURN A.—*cont.*

Stations.	Regiments.	Strength.	Character of the Disease.	Officers.		Men.		Women.		Children.		Total.		Remarks.
				Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	
Delhi	Wing 79th Regiment	361	Cholera	..	..	1	1	..	..	..	..	1	1	25th April, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Meerut ..	Royal Artillery ..	553	Cholera	..	..	5	5	..	..	3	3	8	8	From Aug. 15 to Sept. 25, 1867.
			Choleraic Diarrhœa	..	..	1	1	..	..	..	..	1	1	
	19th Hussars ..	505	Cholera	..	..	1	1	1	1	..	..	2	2	From Sept. 8 to Sept. 21, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
	1 Batt. 3rd Buffs ..	963	Cholera	1	1	103	98	13	11	22	18	139	128	From Aug. 18 to Oct. 6, 1867.
			Choleraic Diarrhœa	..	..	11	4	3	..	2	1	16	5	
Agra	41st Regiment ..	1,012	Cholera	..	..	..	..	1	1	..	..	1	1	September 12, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Muttra	2nd Dragoon Guards	416	Cholera	..	..	1	1	..	..	..	..	1	1	May 14, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Morar ..	Royal Artillery ..	474	Cholera	..	..	6	6	..	..	..	..	6	6	From Aug. 12 to Sept. 15, 1867.
			Choleraic Diarrhœa	..	..	1	..	..	..	..	..	1	..	
	103rd Regiment ..	694	Cholera	..	..	5	3	..	..	2	2	7	5	From May 31 to Aug. 25, 1867.
			Choleraic Diarrhœa	..	..	4	..	..	..	..	..	4	..	
Fortress Gwalior..	Detach. 103rd Regmt.	220	Cholera	..	..	9	5	1	1	3	2	13	8	From July 19 to Sept. 15, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	1	1	1	1	
Cawnpore ..	G Bty. 11th Brg. R.A.	157	Cholera	..	..	1	1	1	1	..	..	2	2	From May 13 to May 24, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
	101st Regiment ..	667	Cholera	1	1	..	..	2	2	3	2	6	5	From May 31 to Sept. 15, 1867.
			Choleraic Diarrhœa	..	..	2	1	..	..	..	..	2	1	
Allahabad ..	Royal Artillery ..	267	Cholera	..	..	3	2	..	..	2	2	5	4	From Aug. 6 to Aug. 24, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	

RETURN A.—*cont.*

Stations.	Regiments.	Strength.	Character of the Disease.	Officers.		Men.		Women.		Children.		Total.		Remarks.
				Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	
Allahabad.	107th Regiment ..	842	Cholera	..	..	24	16	3	1	3	3	30	20	From July 28 to Aug. 24, 1867.
			Choleraic Diarrhœa	..	..	2	..	..	..	..	..	2	..	
	Garrison Hospital ..	208	Cholera	..	..	1	..	..	..	..	..	1	..	From Aug. 7 to Aug. 20, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Moradabad ..	Wing 36th Regiment	307	Cholera	..	..	3	3	1	1	..	..	4	4	From July 28 to Aug. 21, 1867.
			Choleraic Diarrhœa	..	..	3	1	2	..	5	3	10	4	
Bareilly ..	F Bty. 11th Brg., R.A.	169	Cholera	..	..	..	..	1	..	..	..	1	..	From July 30 to Aug. 24, 1867.
			Choleraic Diarrhœa	..	..	1	..	..	..	..	..	1	..	
	37th Regiment ..	878	Cholera	1	1	1	1	3	2	1	1	6	5	From May 10 to Aug. 26, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Shajehanpore ..	Head-Quar. 36th Regt.	616	Cholera	..	..	22	18	7	5	4	4	33	27	From May 8 to Sept. 11, 1867.
			Choleraic Diarrhœa	..	..	2	1	1	..	..	..	3	1	
Seetapore..	D Bty. 8th Brg., R.A.	160	Cholera	..	..	4	3	2	2	2	2	8	7	From Aug. 13 to Sept. 24, 1867.
			Choleraic Diarrhœa	..	..	1	..	..	..	..	..	1	..	
	2nd Batt. 12th Regt.	504	Cholera	..	..	4	3	2	1	1	1	7	5	From Aug. 15 to Sept. 25, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Fyzabad	1st Batt. 11th Regt.	1,136	Cholera	..	..	3	2	3	2	1	1	7	5	From April 28 to May 22, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	1	1	1	1	
Lucknow..	Royal Artillery ..	356	Cholera	..	..	2	2	..	..	..	..	2	2	From Aug. 25 to Sept. 10, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
	5th R.I. Lancers ..	606	Cholera	..	..	..	..	2	2	2	2	4	4	From Aug. 31 to Sept. 23, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
	46th Regiment ..	1,061	Cholera	..	..	4	2	1	1	2	2	7	5	From Aug. 2 to Aug. 21, 1867.
			Choleraic Diarrhœa	..	..	1	..	1	..	1	..	3	..	

RETURN A.—*cont.*

Stations.	Regiments.	Strength.	Character of the Disease.	Officers.		Men.		Women.		Children.		Totals.		Remarks.
				Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	
Lucknow ..	55th Regiment ..	1,091	Cholera	..	..	1	..	1	1	..	..	2	1	From Sept. 12 to Sept. 26, 1867.
			Choleraic Diarrhœa	..	..	1	1	..	..	..	..	1	1	
	Military Prison ..	31	Cholera	..	..	1	..	..	..	..	..	1	..	From May 15 to May 17, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Dinapore	105th Regiment ..	795	Cholera	..	..	1	1	..	..	..	..	1	1	From May 10 to May 17, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Chinsurah ..	Depôt B. Troops ..	552	Cholera	..	..	1	1	..	..	..	..	1	1	From September 24.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Calcutta ..	3rd Bty. 25th Brg. R.A.	52	Cholera	..	..	2	..	..	..	..	..	2	..	From July 3rd, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
	2nd Batt. Rifle Brig..	688	Cholera	..	..	1	1	..	..	..	..	1	1	From May 17 to May 19, 1867.
			Choleraic Diarrhœa	..	..	..	..	..	..	..	..	..	..	
Total Admissions and Deaths ..			Cholera	11	8	642	453	75	54	90	75	818	590	
			Choleraic Diarrhœa	2	1	77	16	12	2	14	8	105	27	
Grand Total of both			.. .. ..	13	9	719	469	87	56	104	83	923	617	

RETURN B.

[To face page 356.

Stations.	Corps.	Total Cases of Cholera. Men. Admitted. Cholera.	Men. Admitted. Choleraic Diarrhœa.	Men. Died. Cholera.	Men. Died. Choleraic Diarrhœa.	Women. Admitted. Cholera.	Women. Admitted. Choleraic Diarrhœa.	Women. Died. Cholera.	Women. Died. Choleraic Diarrhœa.	Children. Admitted. Cholera.	Children. Admitted. Choleraic Diarrhœa.	Children. Died. Cholera.	Children. Died. Choleraic Diarrhœa.	First Observed. Barracks.	First Observed. Families.	First Observed. Hospitals.	Removed into Camp. Men of Affected Barracks.	Removed into Camp. The Regiment as a Body.	Distance from Cantonments.	Relative Position to Cantonments.	Cases subsequent to Removal into Camp. Men, Women, and Children. 1st Day.	2nd Day.	3rd Day.	4th Day.	5th Day.	6th Day.	7th Day.	8th Day.	9th Day.	10th Day.	11th Day.	12th Day.	13th Day.	14th Day.	15th Day.	16th Day.	17th Day.	18th Day.	19th Day.	20th Day.	21st Day.	22nd Day.	23rd Day.	24th Day.	25th Day.	26th Day.	27th Day.	28th Day.	29th Day.	30th Day.	31st Day.	32nd Day.	33rd Day.	34th Day.	35th Day.	36th Day.	37th Day.	38th Day.	39th Day.	40th Day.	Last Case.	Returned to Cantonments.	Remarks.
Peshawur	E. Bat., F. Brig., R. H. Art. F. Bat., F. Brig., R. H. Art. E. Bat., 19th Brig., Royal Art. 4th Bat., 22nd Brig., Royal Art.	62	14	39	5	..	..	..	..	..	..	..	..	20th May 20th „ 25th „ 24th „	.. .. 20th May	..	..	21st May 29th „ 7th June 12th „ 25th May 31st „ 5th, 9th, & 13th June	.. .. Changed ground „ „	Camp Barra Across the River Fort Mackeson Aga Kai Buddee Beer Total number of Cases, 6	..	..	1	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	14	2	..	1	..	..	1	..	..	..	..	..	1	..	6th May	6th June	Returned to Cantonments. Two cases having occurred, left for Fort Mackeson, and finally returned to barracks 6th June.
	42nd Regiment	119	4	67	1	3	..	1	..	5	..	4	..	20th „	..	..	21st May 23rd „ 24th „	The batteries separated on 14th June. 5 Companies 3 „ Remaining Companies and Hospital changed ground 24th. 26th and 29th May changed ground. 31st May marched in wings to Cherat.	Chunkunnee „	..	7	6	37	25	16	8	6	..	4	2	Early days of June, 5 cases.																															
	77th Regiment	74	..	50	..	1	..	1	..	2	..	2	..	21st „	..	21st May	23rd May 27th May, changed ground towards Barra 2nd June „ elevated ground near river 11th „ „ four miles left of river 3rd „ Female and Male Hospital 6th „ Changed ground two miles from Michouc road 10th „ Head-quarters 4th Company to camp near Barra Bridge 8th „ 2nd Company, from head-quarters to opposite side of stream 10th „ Changed to four miles on Barra Road 12th „ Sick from Head-quarters joined 16th „ Camp moved across the River	4 Companies „	4 miles „	..	..	2	2	12	..	1	2	2	1	..	8	..	..	..	7	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24th June	28th June	
Meean Meer	B. Bat., A. Brig., R. H. Art. F. Bat., 19th Brig., Royal Art. 106th Regiment	8 73	.. 5	4 47	.. 1	.. 5	.. 1	.. 4	.. ..	.. 1	.. 1	.. 1	.. 1	11th Aug. 26th May 28th June	.. 1st outbreak 2nd outbreak	4th August.	Infected buildings vacated. 11th August 14th „ 27th May 10th June 28th May 10th June 29th May 9th June 10th „ 1st July 2nd „ 3rd „ 11th „ 16th „ 20th „ 2nd „ 24th „ 26th „ 27th „	To iron-framed temporary bks To Umursidoo Affected Brks. 12 miles Portion of Barkee Detachment joined 4 miles Portion of Barkee Detachment joined 10 miles S. to Barkee Changed ground Left for Hullokee and Umursidoo. 12 miles to Hullokee 4 „ to Umursidoo Shifted 2 „ N. to Chundree 1½ „ E. to Attaree N.E. to Umursidoo To Neaz Bag temporary barrack Shadra Camp Dilkhoosh Bag. Encamping ground, Lahore Left for Hullokee and Umursidoo.	Hullokee Umursidoo	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

SUMMARY of General Return of Cholera as it affected the British Troops in Bengal, from 21st April to 23rd September, 1867 (Men only, classified as Temperate and Intemperate).

Station.	Corps.	Number Attacked.				Result.								Ratio per Cent.	
		Temperate.		Intemperate.		Died.				Recovered.				Temperate Died to Attacked.	Intemperate Died to Attacked.
						Temperate.		Intemperate.		Temperate.		Intemperate.			
		Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.		
Peshawur	E. Bat., F. Brig., R. H. Art.	22	1	3	..	12	1	1	..	10	..	2	..	56·52	33.33
	F. Bat., F. Brig., R. H. Art.	8	7	..	..	6	4	..	..	2	3	..	..	66·66	..
	E. Bat., 19th Brig., R. Art.	21	5	3	..	15	..	1	..	6	5	2	..	57·69	33·33
	4th Bat., 22nd Brig., R. Art.	5	..	..	1	5	..	..	..	..	..	..	1	100·00	..
	42nd Regiment	119	4	..	..	68	1	..	..	51	3	..	..	56·09	..
	77th Regiment	68	..	6	..	45	..	5	..	23	..	1	..	66·17	83·33
Nowshera ..	1st Batt. 19th Regiment	4	1	..	..	2	..	..	..	2	1	..	..	40·00	..
Rawul Pindee ..	D. Bat., F. Brig., R. H. Art.	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Nundkote ..	Detachment, 88th Regt. ..	1	..	1	..	..	..	1	..	1	..	..	..	..	100·00
Murree	Commissariat Depôt ..	4	..	..	..	1	..	..	..	3	..	..	..	25·00	..
Near Murree ..	Family Camp	1	..	..	..	1	..	..	..	..	..	..	..	100·00	..
Fort Lahore	6th Bat., 22nd Brig., R. Art.	1	2	..	..	1	..	..	..	..	2	..	..	33·33	..
	Detachment, 38th Regt. ..	1	..	..	..	1	..	..	..	..	..	..	..	100·00	..
Meean Meer	B. Bat., A. Brig., R. H. Art.	4	..	..	..	2	..	..	..	2	..	..	..	50·00	..
	F. Bat., 19th Brig., R. Art.	4	..	..	..	2	..	..	..	2	..	..	..	50·00	..
	106th Regiment	70	6	3	..	44	1	3	..	26	5	..	..	59·21	100·00
Ferozepore	A. Bat., 19th Brig., R. Art.	4	7	2	..	1	..	1	..	3	7	1	..	9·09	50·00
	1st Batt. 5th Regt. ..	6	..	..	..	6	..	..	..	..	..	..	..	100·00	..
Gooindgurh ..	Detachment, 33th Regt. ..	1	..	..	..	1	..	..	..	..	..	..	..	100·00	..

SUMMARY, &c.—*cont.*

Stations.	Corps.	Number Attacked.				Result.								Ratio per Cent.	
		Temperate.		Intemperate.		Died.				Recovered.					
						Temperate.		Intemperate.		Temperate.		Intemperate.			
		Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.	Temperate Died to Attacked.	Intemperate Died to Attacked.
Bhagsoo	Commissariat Depôt ..	..	..	1	..	..	..	1	..	..	..	..	..	..	100·00
Jullundur ..	82nd Regiment	12	..	..	..	9	..	..	..	3	..	..	..	75·00	..
Umballa ..	A. Bat., F. Brig., R. H. Art.	1	..	..	..	1	..	..	..	..	..	..	..	100·00	..
	21st Hussars	4	..	..	..	2	..	..	..	2	..	..	..	50·00	..
	94th Regiment	23	2	..	..	19	..	..	..	4	2	..	..	76·00	..
Kussowlie ..	Commissariat Depôt ..	1	..	..	..	1	..	..	..	..	..	..	..	100·00	..
Subathoo	90th Regiment	28	11	..	..	19	..	..	..	9	11	..	..	48·71	..
Delhi	R. W., 79th Regiment ..	1	..	..	..	1	..	..	..	..	..	..	..	100·00	..
Meerut ..	A. Bat., A. Brig., R. H. Art.	3	1	..	..	3	1	..	..	..	..	..	..	100·00	..
	B. Bat., 16th Brig., R. Art.	..	..	1	..	..	..	1	..	..	..	..	..	..	100·00
	C. Bat., 19th Brig., R. Art.	1	..	..	..	1	..	..	..	..	..	..	..	100·00	..
	19th Hussars	..	..	1	..	..	..	1	..	..	..	..	..	..	100·00
	1st Batt. 3rd Buffs ..	96	10	7	1	91	3	7	1	5	7	..	..	88·67	100·00
Muttra	2nd Dragoon Guards ..	..	..	1	..	..	..	1	..	..	..	..	..	..	100·00
Morar ..	C. Bat., F. Brig., R. H. Art.	2	1	3	..	2	..	3	..	..	1	..	..	66·66	100·00
	E Bat., 11th Brig., R. Art.	1	..	..	..	1	..	..	..	..	..	..	..	100·00	..
	103rd Regiment	5	4	..	..	3	..	..	..	2	4	..	..	33·33	..
Fortress Gwalior ..	Detachment, 103rd Regt.	9	..	..	..	5	..	..	..	4	..	..	..	55·55	..
Cawnpore	G. Bat., 11th Brig., R. Art.	1	..	..	..	..	..	..	..	..	..	..	..	100·00	..
	101st Regiment	..	2	..	..	..	1	..	..	..	1	..	..	50·00	..

SUMMARY &c.—*cont.*

Station.		Number Attacked.				Result.								Ratio per Cent.	
		Temperate.		Intemperate.		Died.				Recovered.					
						Temperate.		Intemperate.		Temperate.		Intemperate.			
		Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.	Temperate Died to Attacked.	Intemperate Died to Attacked.
Allahabad	A. Bat., 22nd Brig., R. Art.	3	..	..	..	2	..	..	..	1	..	..	..	66·66	..
	107th Regiment	18	2	6	..	10	..	6	..	8	2	..	..	50·00	100·00
	Detachment, 107th Regt.	1	..	..	..	..	..	..	..	1	..	..	..	..	..
Bareilly ..	F. Bat., 11th Brig., R. Art.	..	1	..	..	..	..	..	..	..	1	..	..	..	..
	37th Regiment	1	..	..	..	1	..	..	..	..	..	..	..	100·00	..
Moradabad ..	Wing, 36th Regiment ..	3	2	..	1	3	..	..	1	..	2	..	..	60·00	100·00
Shahjehanpore ..	Head-Quarters, 36th Regt.	20	2	2	..	16	1	2	..	4	1	..	..	77·27	100·00
Seetapore ..	D. Bat., 8th Brig., R. Art.	4	1	..	..	3	..	..	..	1	1	..	..	60·00	..
	2nd Batt. 12th Regt. ..	4	..	..	..	3	..	..	..	1	..	..	..	75·00	..
Fyzabad	1st Batt. 11th Regt. ..	3	..	..	..	2	..	..	..	1	..	..	..	66·66	..
Lucknow ..	C. Bat., A. Brig., R. H. Art.	1	..	..	..	1	..	..	..	..	..	..	..	100·00	..
	3rd Bat., 22nd Brig., R. Art.	1	..	..	..	1	..	..	..	..	..	..	..	100·00	..
	46th Regiment	4	1	..	..	2	..	..	..	2	1	..	..	40·00	..
	55th Regiment	1	1	..	..	..	1	..	..	1	..	..	..	50·00	..
	Prison	1	..	..	..	..	..	..	..	1	..	..	..	..	..
Dinapore ..	105th Regiment	1	..	..	..	1	..	..	..	..	..	..	..	100·00	..
Chinsurah ..	Invalid Depôt	1	..	..	..	1	..	..	..	..	..	..	..	100·00	..
Calcutta ..	2nd Batt., Rifle Brigade ..	1	..	..	..	1	..	..	..	..	..	..	..	100·00	..
	3rd Bat., 25th Brig., R. A.	2	..	..	..	..	..	..	..	2	..	..	..	..	..
Total ..	.. ..	602	74	40	3	419	14	34	2	183	60	6	1	64·05	83·72

G. S. BEATSON, M.D., *Inspector-General of Hospitals,*
and Principal Medical Officer of British Troops in India.

APPENDIX No. XLI.

REPORT ON THE EPIDEMIC OF CHOLERA IN THE SIRHIND DIVISION DURING THE SEASON OF 1867.

By Deputy Inspector-General W. Munro, M.D., C.B.

It is known to be a fact that cholera was not prevalent anywhere in the Sirhind Division in the early part of April 1867. It is also a fact that about the middle and end of that month it did appear, and that since that date it has been more or less prevalent throughout the whole division up to the end of September.

Early in April, the appearance of the disease amongst the pilgrims returning from the Hurdwar Fair was publicly announced; and this announcement was substantiated by an official report to that effect from the Medical Officer who was on special duty there, to Dr. Cox, Deputy Inspector-General of Hospitals, Her Majesty's Indian Service, then in medical charge of the Sirhind Division.

The pilgrims began to assemble at Hurdwar towards the end of March, and immediately after the day of bathing, the 12th of April, many pilgrims began to leave the place.

There were probably three or four millions of persons at the fair. These were scattered all over the place; many were located in the city; others erected huts or tents wherever they found it convenient; and thousands slept on the ground without covering or protection of any kind. The conservancy arrangements were, I understand, excellent, and were acknowledged to be so even by the natives themselves.

Many natives from the city of Umballa, some from the cantonments, and many from the villages around, were present at the fair.

During the time the fair lasted, the weather was hot by day and cold by night, and a strong cold breeze at all times blew along the course of the river; and during the most busy time several heavy showers of rain fell, accompanied and followed by unusually cold piercing wind.

I understand that immediately after this, cases of cholera amongst the natives occurred, but not many. My information is obtained from native sources, and from a missionary who was there, but none of my informants saw any cases of the disease.

My informant who is well able to judge, told me that the whole space occupied by the pilgrims was kept very clean, and that in no locality which he visited was there anything offensive to either sight or smell.

As soon as several cases were known to have occurred, criers were sent round warning the people to disperse, and they accordingly commenced to break up from the fair. A small stream passed through Debra, a larger crossed the Ganges at Hurdwar, and proceeded to Oude and to the hills on the north and north-east borders of that province, but the great mass passed down the Ganges towards Roorkee, and from thence diverged in different directions. Those for the upper provinces, for Umballa, and for the districts on the north and west of it, would necessarily pass through or near the cantonments of Umballa.

The Deputy Inspector-General of Hospitals, Her Majesty's Indian Service, in charge of the division, on hearing of the appearance of cholera amongst the pilgrims at Hurdwar, which, as already stated, was officially

announced to him, most prudently proposed, for the consideration of the Major-General Commanding at Umballa at that time, to arrest the coming stream of pilgrims, and prevent their access to the station and city of Umballa. It was therefore resolved by the Major-General, in conjunction with the Commissioner, to establish a *cordon sanitaire* round the station, consisting of police and native cavalry, whose instructions were to turn the pilgrims off the main road at the village of Taipla, six miles distant from the station, in a south-easterly direction, on the grand trunk road, and to direct them into a country road passing behind and between cantonments and the hills, about two miles east of the station. These precautionary measures had not been quite established when the pilgrims began to make their appearance, and a few absolutely passed through cantonments as early as the 15th April, without having been seen in time to turn them into the proposed route. From the village of Bolo, north-east of the cantonments (which village was on the intended route), the pilgrims for the upper provinces were to continue their route past the city of Umballa, and still along by-paths. At the same time it was deemed advisable that all pilgrims belonging to the Sudder Bazaar, the city of Umballa, and the neighbouring villages, should, on arrival in the vicinity of cantonments, remain in quarantine camps until it could be ascertained whether or not they were free from the disease, and this period of quarantine was fixed at five or six days.

The great moving mass of pilgrims was thus prevented passing through cantonments and the city, though, as already stated, some few (it was positively ascertained) had found their way into and through the cantonments.

About 16th April crowds of pilgrims had arrived in the neighbourhood of Saipla, and amongst them cholera was found to be extensively prevalent; and every assistance in the way of medical advice, medicine, food, &c., was freely and liberally supplied to them. "On the 17th and 18th this mass of people continued their march from Saipla on foot, on camels and elephants, and in bullock-carts; and along the by-path they travelled, and in the vicinity of villages near which they halted, I am informed that unfortunates were stricken down by cholera—the dying, the dead, and the ashes of the dead, marked their course. The sick and the dying were tended as well as circumstances would permit, and the unclaimed dead were buried by the police."

By the 22nd April, the great mass of the pilgrims had passed through the district; but up to this date, I am informed by Deputy Inspector-General Dr. Cox, of Her Majesty's Indian Service, that the disease had not appeared in any of the villages near which the pilgrims halted; but that very soon after that date, the disease did appear amongst these villages, and gradually extended throughout the whole district through which the pilgrims had passed.

On the 19th April the first case occurred in the Umballa cantonment. A woman (a prostitute) living in the 94th Regimental Bazaar, which is within 50 yards of the grand trunk road, was seized with cholera, and died after an illness of 5½ hours. I cannot ascertain, however, whether or not this woman had been in communication with pilgrims. On the 20th, another death from cholera occurred in this bazaar, but in a different part of it; and again on the 21st, another case. A native doctor with a supply of medicine was immediately attached to the bazaar; and whitewashing and other sanitary measures put in operation.

On the 22nd, two Europeans were seized with cholera: one a man of the 11th Regiment, on his way down country from Souawar. This man had crossed the line of pilgrims the day before his illness. The second man belonged to the 94th Regiment, and he had been in the company of the first man the whole day before that on which he was taken ill. These two cases were treated and died in the 94th Hospital. The first proved fatal in 14 hours, and the second in 8½ hours.

On the morning of the 23rd April, twenty cases of cholera were reported to have occurred in the 94th Bazaar during the previous night, five of which proved fatal. The bazaar was accordingly at once vacated, and all the inhabitants turned out into camp. Hospital sheds were erected at their camp, and a native doctor, with a supply of medicines, accompanied them.

At 2 P.M. on the 23rd April, an officer (Lieutenant Mercer) and the wife of

a soldier of the 94th Regiment were taken ill with cholera. The Surgeon of the regiment, and, I believe, both Assistants, were suffering from choleraic diarrhœa; and the Surgeon eventually had true cholera, and had to be sent home to England. It was therefore resolved to send the regiment into camp at once, and accordingly that night it moved out of barracks, and encamped about three miles south-west of the station.

The disease was entirely confined at that time to that part of cantonments which is close to the grand trunk road, the bazaar and barracks, 94th Regiment.

During the 24th and 25th April there were no fresh cases in the 94th Regiment, but on the 26th a patient in hospital (in camp) was seized with cholera, and that evening the regiment moved to fresh ground, about four miles south-west of cantonments.

On the 29th April there was another case in camp, and one amongst the women who had been left in quarters. On the 3rd May there were two other cases in camp, and the regiment changed ground again, moving due south. On the 4th and 5th May there were three more cases, two of them proving rapidly fatal. The regiment therefore again changed ground to a spot 4½ miles south-west of the last camp. Here, however, seven cases occurred, and five of them proved fatal within 48 hours. It was therefore deemed advisable to break up the regiment into detachments, and accordingly three camps were formed between 2 and 4 miles from each other. At the same time the women and children were sent to a rest-house on the grand trunk road, about 12 miles from the station.

These changes were beneficial, especially as far as the two most distant camps were concerned; but in that nearest to cantonments (head-quarters) diarrhœa was very prevalent, and one case of cholera occurred. This party (head-quarters) was again moved about 5 miles in an easterly direction, and there it remained until its return to barracks. The other detachments also changed ground once more.

After 5th May there were no more cases of cholera in this regiment, nor had any occurred amongst the families moved out to the rest-house during the whole of their stay there. On the 19th May the regiment returned to quarters, and from that date (with the exception of one fatal case of cholera which occurred on June 9) the corps has been remarkably healthy.

While in camp it did not suffer in the least from exposure to solar influence, although the thermometer stood at 112° in the tents.

It appears that much difficulty was experienced in finding suitable camp-grounds for this regiment. With one exception, all the established cholera camp-grounds are to the north and east of the cantonments, where the ground is high; but not one of these was available, as they are near, or on the track of the pilgrims, and the disease was, at the time the regiment turned out, prevalent in the villages in those directions.

It was therefore necessary to use places which in the rainy season could not be occupied; and even in the direction taken by the 94th Regiment, viz., south-west, south, and west, cholera gradually made its appearance.

As mentioned already, the bazaar of the 94th Regiment had been moved into camp on the 23rd April. Between that date and the 29th there were twenty cases of cholera, and thirteen of them fatal, in this camp. The camp, therefore, was moved 6½ miles due south; and from the 29th April to 8th May there were sixteen cases of cholera amongst them, eight of which proved fatal. After the 8th May the disease disappeared from amongst these natives, and they were permitted to return to the bazaar, which had in the meantime been thoroughly cleansed.

On the 2nd May one case of cholera occurred in the Royal Horse Artillery in Umballa, which proved fatal within eight hours. The man had been exposed to the sun the whole day preceding his illness and death, fishing in a tank near the station. This was the only case in this corps.

On the 4th May two cases of cholera occurred in the bazaar of the 21st Hussars (this bazaar is next the 94th's bazaar, but behind and further to the east), and on the 6th May another case was reported. On the 9th May a woman of this regiment was taken ill with cholera in her quarters, and died in hospital in eleven hours. On the 13th May a soldier of this regiment was taken ill in

barracks, and on the 16th another was seized with cholera. The former recovered, the latter died.

On 18th May there were four cases in the bazaar of this regiment, two of which proved fatal. On the 19th another woman of this regiment was taken ill with cholera, but recovered. On the 28th May there were two cases in this bazaar, and these were the last that occurred at that time in any part of the lines of this regiment.

Early in June (3rd and 6th) several cases of cholera occurred in the 31st Native Infantry, and a portion of the corps was at once moved into camp, close to their lines. Diarrhœa became prevalent in this corps at the same time, which was coincident with a scarcity of water at that end of the station, owing to the drying up of the wells.

At the same time that the crowd of pilgrims was passing round the station and city of Umballa, the Maharajah of Cashmere, with several thousands of followers, arrived in the neighbourhood, and with cholera in his camp. He was likewise denied permission to pass through cantonments, and went *viâ* Roopur straight towards his mountain principality. It is supposed that many pilgrims belonging to the villages about Kussowlie, Subathoo, Siree, Simla, &c., accompanied his camp, who branched off at the foot of the hills, and proceeded to their respective homes. Numbers of these persons passed through Kalka.

Between the 18th and 28th April many cases of cholera were known to have occurred amongst pilgrims passing through Kalka, and subsequently amongst the residents in that village.

I have been informed by a native that he saw, between the 18th and 30th of April, pilgrims die of cholera on the roads at Kalka, leading both to Kussowlie and Dhurmpore, and that immediately after the arrival of the pilgrims, he saw men belonging to Kalka (who were not pilgrims) die of cholera—as many as five and six a-day.

I have also been informed by a Eurasian resident at Kalka, that on the Sunday after Good Friday she met, on her way to Sonawar *viâ* Kussowlie, between these two places, a litter being carried along the road in which there was a person ill with cholera. This person also told me that on the same day she met a woman who told her that she had lost her husband from cholera on the road between Kalka and Kussowlie.

Many pilgrims about this time passed through Kussowlie, and immediately after cases of cholera occurred in the Sudder and regimental bazaar there, where, until the arrival of these pilgrims, there had been no cholera.

On the 22nd April, the Medical Officer in charge of the convalescent depôt recommended that the road leading from Kalka to Kussowlie should be closed, and by this and other rigorous police measures the disease was excluded from the station.

On the 20th April, a Brahmin Shroff returned from Hurdwar to Sunawar. On the 22nd, five other pilgrims (printers to the Lawrence Asylum) returned from Hurdwar—all in good health. Three days afterwards, a pilgrim from Hurdwar died of cholera in the main street of the village of Gurkul, *one mile* from Sunawar, and between it and Kussowlie. This, I am informed by the Medical Officer in charge of Sunawar, was the first known case of the disease in this immediate neighbourhood.

On the 26th April a tailor belonging to the Asylum was taken ill with cholera while at work in the boys' barracks inside the Asylum, and he died on 27th. On the 29th another tailor belonging to the Asylum, who lived in the village of Gurkul, was taken ill with cholera, but recovered. Neither of these two tailors was a pilgrim. These two seizures were so immediate on the death from cholera of the pilgrim, which, as mentioned above, occurred in the street of the village of Gurkul as to appear like cause and effect.

On the 23rd April several persons ill with cholera were carried along the road below Subathoo (the old Simla road), having passed round, not through Kussowlie. These persons were seen and tended by two European women at Kuker Huttee. On the same day the Dhurmpore road, leading to Subathoo, was closed, and also the road leading up to Subathoo from Kuker Huttee. On the same day, 23rd April, a woman of the 90th Light Infantry at Subathoo was taken ill with cholera and died. This woman, on either the day before

or on the morning of the same day, had met some of the pilgrims on the road below Subathoo.

The policeman on duty to prevent communication between Kuker Huttee and Subathoo died of cholera on the 24th April. This man had seen the persons who were tended by the two European women, as mentioned already.

The metzanee who tended the woman of the 90th Light Infantry, that died of cholera on the 23rd, was taken ill with cholera and died.

Immediately after the arrival of the cases of cholera at Kuker Huttee on the 23rd, one of the residents in the village of Kuker Huttee (not a pilgrim) died of cholera. Cases of cholera occurred at the same time in the Kotar village, close to Kuker Huttee, immediately after the passage of pilgrims through that village.

On the 26th April the roads leading from Kalka to Kussowlie were re-opened by order of the Civil Commissioner, though cholera was known to be still prevalent at Kalka.

The Medical Officer protested against this, but apparently without success. I find it noted in this officer's diary that cases of cholera had occurred in the villages round Kussowlie, and that one case of choleraic diarrhœa had on that day (26th April) occurred in the Sudder bazaar of that station.

On the 11th July a soldier of this depôt was admitted to hospital with cholera. The case terminated fatally; and at the same time several cases of cholera occurred in the bazaars, and one (a native servant) in the station.

Early in September a few cases of choleraic diarrhœa occurred amongst the children in the normal school; and about the same time two cases of cholera occurred at Sunawar—one the steward, and the other one of the boys; both fatal.

The Medical Officers at Kussowlie deserve great praise for their care, watchfulness, and wise and energetic conduct during the whole season.

During several days after the first fatal case of cholera (the woman) occurred on 23rd April at Subathoo, diarrhœa became very prevalent in the 90th Light Infantry; and on the 27th April another case of cholera (a soldier of the regiment) occurred, and proved fatal. Two children were taken ill with the disease on the 3rd May, and of these one died on the 4th May.

From the 3rd May to the first week in June, the station of Subathoo was free from the disease; but on the 3rd June three men of the regiment were admitted to hospital with cholera, and diarrhœa again became suddenly prevalent. During the second week of June two more cases of cholera occurred, and during the third week one case of choleraic diarrhœa. During the fourth week of the month diarrhœa had entirely ceased in the regiment, and the senior Medical Officer reported that the bazaar was free from disease.

During the month of July diarrhœa again became prevalent in the 90th Light Infantry, and on the 28th of that month the Medical Officer in charge reported that a patient in hospital, admitted with diarrhœa on the 4th of the month, had been seized with true cholera, and died within a few hours after choleraic symptoms set in.

In the same letter this Medical Officer reported the occurrence of two cases of cholera in the bazaar; and also stated that several deaths were said to have taken place amongst the natives of the bazaar from cholera, but that it was doubtful whether this report was correct. On the 29th July another case of cholera occurred in the regiment; and a child (of the regiment) suffering from diarrhœa and fever was admitted to hospital, but he does not say how this case terminated. No fresh cases of cholera occurred in the bazaar.

On the 30th July this Medical Officer reported that several cases of diarrhœa of an aggravated form had occurred amongst the bazaar natives during the previous night; and that at 2 P.M. of that day, a soldier of the regiment, employed in the workshops, was seized with cholera while at work. He had been suffering for some time with diarrhœa, though he concealed the fact. On the 31st this man died, and the tendency to diarrhœa, in both natives and Europeans, had increased.

On the 1st August a soldier's wife was admitted to hospital with cholera, and a sweeper belonging to the hospital was seized with the disease, but there were no cases in the bazaar.

On the 2nd August another soldier was admitted with diarrhœa, which passed into cholera. A child died of cholera in the bazaar, and four soldiers were admitted to hospital with diarrhœa.

On the 3rd August there were no cases, either amongst Europeans or natives.

On the 5th August, cases of diarrhœa, amongst Europeans and natives, were reported.

On the 6th the man admitted to hospital on the 2nd died, and on the same day seven cases of diarrhœa (choleraic diarrhœa no doubt, though the Medical Officer does not say so) occurred in the station: four of them European, and three natives.

On the 7th two cases of diarrhœa were admitted to hospital, and one boy (a native) died in the bazaar of cholera.

Between 28th July and 7th August nine cases of cholera, and about the same number of what I presume was choleraic diarrhœa occurred in Subathoo. I therefore considered it advisable that I should go thither myself, and accordingly obtained permission from the Major-General Commanding to do so.

On the morning of 8th August I arrived in the station, and found that for thirty-six hours previous to my arrival no fresh cases of cholera had occurred, amongst the Europeans at least, and that the last case among the natives was on the 7th. Two cases of cholera (a man and a woman of the regiment) remained under treatment in hospital.

Within a few hours after my arrival, one native, a baker in Commissariat employment, was taken ill with cholera while at work. He died that night.

On the day of my arrival I inspected the barracks and hospital, and saw all the men of the regiment in their barrack-rooms. On considering the season, and the fact that several cases of cholera and choleraic diarrhœa had only recently occurred in the regiment and station, and knowing that the disease had been and was said to be still prevalent in the neighbouring villages, I thought that the men and families were dangerously crowded together, especially in the old barracks; the greater number of which are badly situated, all badly ventilated and inconveniently constructed, affording too small an amount of superficial space, and moreover at that time extremely damp. The four buildings at the east of the line of barracks, and those especially used as canteens and for married men, were most objectionable, both as to ventilation, circulation of air around them, &c. I therefore, as precautionary measures, recommended that two companies, consisting of healthy men, should be immediately sent to Solon, where a detachment of the regiment was already, with a Medical Officer, but at same time I advised that the two parties should be kept in separate camps for a time. The Deputy Assistant Quartermaster-General, who accompanied me to Subathoo by the Major-General's orders, at once took steps to carry out this arrangement.

At same time I recommended that a third company should occupy tents, already pitched by the Officer Commanding 90th Light Infantry at the suggestion of the Medical Officer in charge, on a height above Subathoo. Also, that the married people should, if possible, be moved out of the building then occupied by them; and finally that tents should be immediately brought up from Kalka and stored at Subathoo, so as to be at hand should it eventually be necessary to move the whole regiment out of the station.

The old barrack, occupied by fifteen families, to which I have already alluded, was not only damp and dark, but its ventilation and the circulation of air round it were so obstructed by its position (against the side of a hill), by temporary partitions (some of them consisting of damp sun-dried brick and mud plaster), and by closing up of doorways and archways to make separate quarters for families, that I was not surprised to see them looking wan and pale, to hear that they had suffered from fever, and that cases of cholera and choleraic diarrhœa had occurred amongst them.

I am aware that Major-General Becher had seen this building either in June or early in July, and expressed disapprobation at its arrangements. The Major-General informed me that he stopped the further erection of mud partitions, and ordered matting to be used instead.

I also recommended that fires should be lighted in all the barracks for some hours every day, to dry them as well as air them.

Within twenty-four hours after my arrival at Subathoo, thirteen case of cholera occurred in the station, including men, women, children, and natives belonging to the regiment and to the bazaars. I therefore thought it necessary to recommend the immediate removal of the regiment from the station. Preparations were accordingly made, and by the 14th of the month (August) the corps was divided into five different parties (including Subathoo, where the married people remained), and sent out into camps in different directions, and at various distances from each other.

The first party, consisting of 48 men, had moved into camp, on the 9th, on the height above Subathoo. The second, consisting of two companies, moved to Solon early on the morning of the 10th. The third moved to Banalooghee, six miles from Subathoo, on the old Soodiana road—12th and 13th. On the 13th and 14th, the head-quarters, consisting of three companies, moved to a ridge of hills, four miles east of Subathoo, and the married men, with their families, moved on the latter date into the new barracks, each family getting a whole room to itself.

Lastly, the chronic cases of sickness, and those suffering from other diseases than cholera or choleraic diarrhœa, were moved into the chapel or school-room, thus removing them from the choleraic atmosphere of the hospital, and giving up that building to cholera and choleraic diarrhœa cases exclusively.

On the 14th August, the distribution of the regiment was as follows:—

On the height above Subathoo	48
At Banalooghee Camp....	227
At Solon	183
Head-quarters at Dhobie's Ghat	206
In Subathoo, Staff-Serjeants, married people, and sick	62

Before leaving Subathoo, I had, with the Deputy Assistant Quartermaster-General and Officer Commanding the 90th Light Infantry, selected a site for a camp on the Dhurmpore road, about four miles from the station, in case it should be necessary to move the company from the height above the station, or to move the families into tents.

In former years, I had acquired some experience in moving a regiment stricken with epidemic cholera, and came to the conclusion that any movement made at night was invariably followed by the occurrence of a greater number of cases of cholera and diarrhœa than those movements made in the early morning. I give the following explanation of this: men commence their march in the evening when the heat of day is scarcely over; as they march they become warm, but the temperature of the air is gradually lowering, and when they arrive at the new camp ground, and have to wait about for their tents, many throwing themselves on the ground, they become chilled, and cases of cholera and diarrhœa follow, and these cases of diarrhœa often pass into cholera: such was my experience as Surgeon of the 93rd Sutherland Highlanders. By moving in the early morning the men have been refreshed by sleep; the temperature gradually rises as they march, and the men escape being chilled, even though they run the risk of being exposed for a couple of hours to the morning sun. This exposure to sun I consider by far a less evil than being chilled at night.

I think the rule to adopt is to form the camp or camps first, then to march the parties out in the morning, their cots and baggage accompanying them. The distance should be as short as possible, and hot coffee or tea (not rum) should be ready for the men at the new ground. This was the plan proposed by me in 1862, followed by my old Commanding Officer, and it was ordered by Major-General Becher to be strictly carried out in the case of the 90th. I consider it most injudicious, when it is deemed necessary to move a regiment for cholera, to do things in too great a hurry, for confusion follows, the men get excited and alarmed, and nothing, in my opinion, is more unfortunate than the least approach to panic, in times of epidemic visitations.

The moving into camp of the 90th Light Infantry was followed by good

results. The party that marched to Solon has not had one single case of cholera. The party at Banaloghee has only had one case of cholera and one of choleraic diarrhœa. The former, a soldier who had been lately in hospital for fever, and who was very weakly; the latter an officer who had been suffering from diarrhœa for several days.

The party at Dhobie's Ghat has been less fortunate. On the first day, in fact as the party was marching out and before it reached the camp ground, one man was taken ill with cholera, and was sent back to hospital at Subathoo. On the 16th August, two days after going into camp, one case of cholera occurred, and several of diarrhœa. The case of cholera ended fatally on the 17th, but the diarrhœa cases recovered. They all came from one company, and as I was on the spot, I at once recommended the tents of this company and of the hospital where the death occurred, to be moved to higher ground, which was done.

On the 19th August, two cases of cholera and one of choleraic diarrhœa occurred in the party encamped on the height above Subathoo. This party was accordingly moved on the 20th to the ground selected by me on the Dhurmpore road, and was perfectly healthy afterwards.

These two cases of cholera are not, I find, attributable to anything connected with the camp however. The men were taken ill either while on guard at the Old Fort, in the Subathoo, or just as they came off guard. This fort is a most likely spot for cholera to appear and even remain in; and the guard-room within the enclosure, where these men were taken ill, is a small, low, ill-ventilated, room, shut in by high walls, and at that time with a foul privy just in front of it.

The families have been free from both cholera and diarrhœa since they were removed from the old, low, damp, ill-situated, and badly-ventilated barracks to the new buildings, and not a case of cholera has occurred amongst the men moved from the hospital to the chapel or schoolroom.

At the same time that the regiment moved out I recommended that the bazaar or city (as I believe it is considered) should be gradually purified, and as it is too large to turn out all the inhabitants at one time, I proposed the following plan—viz., to vacate portions of it in succession, encamp the inhabitants of that portion, which should be cleansed, fumigated, aired, and whitewashed: and after 10 days the inhabitants (if free from cholera during that time) to be allowed to return to their houses, and so on, until the whole bazaar or city had been vacated, cleansed, &c.

This was done, and I have no doubt Subathoo never before had such a purification.

On the 25th August three more cases of cholera occurred in the bazaar, one of these a woman just arrived from Simla.

On the 29th August two cases of cholera and one of choleraic diarrhœa occurred in the camp at Dhobie's Ghat, two from one company, and the diarrhœa case from another. The two cases of cholera died after a short illness, but the case of choleraic diarrhœa was subsequently pronounced to be a case of dysentery. This terminated fatally after many days of illness. My own impression of this case (I did not see it however) is, that it was a case of choleraic diarrhœa, which terminated in an inflammation of the bowels, which ran into gangrene, and ended in death.

Ten days' exemption from cholera in camp is supposed to be a sufficient period of time to keep a regiment or party in quarantine, after which period of exemption it may safely return to quarters. Here, however, is an instance in which there was complete immunity from the disease for fifteen days, when cases of as virulent cholera occurred as any previously under treatment.

Immediately on hearing of these cases (after my return to Umballa), I recommended that this party should move from the neighbourhood altogether to an open ridge about five miles from Dhobie's Ghat, and two from Solon. This move was carried out by order of the Major-General, and since then this party has been quite free from cholera or bowel complaints of any kind.

These were the last cases in this regiment. Altogether there were amongst the men 39 cases of cholera and choleraic diarrhœa in the regiment; of these 30 occurred in quarters, and nine in camp. Amongst the women and children there were 16 cases of cholera and choleraic diarrhœa, and all of

these occurred before they moved out of the old into the new barracks. The conclusion is manifest—viz., that moving was beneficial.

The 90th Light Infantry was not a healthy body of men on arrival at Subathoo. In the Peshawur Valley the men had suffered much from fever, both remittent and intermittent; and on the march from Nowshera, in the spring, a number of cases of low typhoid fever, complicated with pneumonia, had occurred, and even after arrival at Subathoo intermittent and low remittent fevers were often, nay constantly, being admitted to hospital.

On my inspection of the regiment on 8th August, I was struck with the anæmic appearance of the great majority of the men, and recommended the Surgeon to commence at once, and continue till improvement was apparent, the daily issue of quinine to the whole regiment. I also recommended on the corps moving into camp, that the issue of beer should be discontinued, as probably tending to cause diarrhœa, and that an extra issue of rum should be given instead. This was sanctioned.

On the 10th September the party encamped on the Dhurimpore road, proceeded to join the Solon party; and towards the end of September all restrictions with respect to communication between the different camps were withdrawn.

As soon as the barracks at Subathoo were vacated, I advised that purifying, fumigating, and cleansing should commence; also that ridge ventilators of the old barracks should be properly opened, and that the wooden ceilings in the dormitories should be removed altogether, as they were only obstructions to free ventilation. These alterations were ordered to be carried out. I further recommended that this regiment should remain in camp until the 15th October, or until the cold weather had set in; and this, meeting with the approbation of the Major-General, was sanctioned by His Excellency the Commander-in-Chief.

During the whole month of June cholera was very prevalent in the villages round Umballa, though the station was free from it, with the exception of one case in the 94th Regiment on June 9th.

In July seven or eight cases occurred in one day amongst the Commissariat cattle servants, located behind the Sudder bazaar. The whole of these servants were moved out at once, kept out for 10 days, and then allowed to return. From that date every day or two, a case or several cases were reported in the Sudder, but the other bazaars were exempt from the disease.

The troops were excluded from this bazaar, and all natives in the station cautioned to have as little intercourse as possible with the Sudder.

On 28th August nine cases of cholera were reported in a village south of, and close to, cantonments. On 14th September several cases occurred simultaneously in different parts of the Sudder. On 13th September Dr. Scott of Her Majesty's Indian Service, was taken ill with cholera. On the 13th and 14th September two cases were reported in the 11th Bengal Cavalry bazaar. On the 22nd September two cases occurred amongst the soldiers of the 21st Hussars; and on the 23rd and 24th two cases were reported in the bazaar of this regiment, and one* case occurred in the compound of one of the private dwelling-houses in the Royal Horse Artillery Bazaar.

All these cases, from the first reported on the 28th August in the Sudder to the last which was in the 21st Bazaar, were at long distances from each other, and happened in succession in directly opposite directions from each other.

One solitary case was reported on 1st October (I am not quite sure of the day, but either 1st or 2nd of the month), and that was the last at Umballa.

On the occurrence of the two cases in the 21st Hussars (in barracks 4 and 6), the men in the rooms from which the cases came were put into tents, and the rest of the corps, which had unavoidably been too much crowded during the whole hot season, were opened out and placed, some in a barrack just roofed, and some in the new married infantry quarters, just finished. After being 14 days in tents, the men turned out of barracks were allowed to return to their rooms, which, in the meantime, had been fumigated, cleansed, and whitewashed.

* This case was before those in the bazaar of the 21st Hussars.

During the whole hot season cholera has been prevalent in the Jullunder district, having appeared there after the passage of the Hurdwar pilgrims through it. Not a case had been heard of before that event. The disease appeared in the Jullunder Sudder bazaar, and several cases occurred at intervals throughout the season in this part of cantonments, the last having been reported on the 30th August.

On 3rd September, 1867, the disease first appeared in the 82nd Regiment, in the Medical Subordinate quarters, then in the hospital, then in No. 12 married quarters, and then in No. 6 barracks. On 4th September the hospital and married quarters were vacated, and the patients and families put into tents. On the 5th September another woman who had been in No. 12 building was taken ill, and on the same day the men of No. 6 barrack were moved into camp. These three different parties—viz., the hospital, the families of No. 12 barrack, and the company from No. 6 barrack were encamped together. On the morning of the 6th September the rest of the regiment and the families from No. 19 married barracks moved into a separate camp. No case of cholera occurred in this party at all, either before or after moving into camp. It changed ground twice, as the locality selected each time was unfavourable in a sanitary point of view, on the first occasion moving in a north-easterly direction, and on the second in a north-westerly direction.

As the head quarter party was uncomfortably crowded in tents, I proposed, as they had never had any cholera amongst them (and the Major-General approved), that two companies should return to barracks, and occupy buildings farthest from those in which cholera had appeared. This arrangement was carried out, and no bad consequences to these companies followed, and those remaining in tents benefited as far as space and comfort were concerned. On the morning of the 9th September the infected camp (that first turned out) moved to fresh ground in a south-western direction, and moved again on the 11th September. From the evening of the 5th to 12th September no fresh cases were reported; but on the evening of the latter date there were three cases The camp was, therefore, moved a short distance to the north-west. Here six more cases occurred. On the 15th September this party moved again in a north-westerly direction, and kept moving every second day thereafter till the 2nd October, when, having been 19 days without fresh cases, the whole regiment returned to quarters.

At the same time that *two* companies were ordered back to barracks, the families of No. 19 barracks were also sent back; but on the 14th and 15th September two cases of cholera (a man and a child) occurred amongst them, but as no tents were available they were put into one of the men's empty barracks. On the 17th September, however, another case occurred amongst them in their new barracks, and tents having in the meantime arrived from Ferozepore, they were again moved into camp 3 miles south-west of the station. On the 20th September a mild case of choleraic diarrhœa occurred in this new camp. This was the last case approaching to cholera, and closes the details connected with the epidemic visitation of cholera in the Sirhind Division.

The disease in this corps first appeared in the hospital and vicinity, and was confined throughout chiefly to those persons who occupied buildings in which it first appeared. In the neighbourhood of the hospital (about 200 yards distant) is a large tank on one side. On the other side, close to the hospital, is one of the large surface drains of the station. Report says (I do not know how truly) that the hospital stands where an old tank formerly was, and which had been filled up with earth taken from a Mohammedan burial ground, and close to where formerly stood a village in which cholera frequently prevailed. As already stated, it was difficult to find suitable camp ground for the 94th. In the immediate neighbourhood of Subathoo it was difficult to find suitable ground for more than two companies together. This, however, was probably an advantage, although it increased the difficulty of transport, and retarded a more rapid removal of the whole regiment from the station. In the neighbourhood of Kussowlie there is a long isolated ridge, suitable for the encampment of upwards of 1,000 men; and east of Dugshai there are several ridges and hills suitable for camps. Of Jullunder and its vicinity I cannot speak, but I shall take an opportunity during the coming cold season,

to make myself thoroughly acquainted with the country in that part of the division.

From the details given in this hurried report, it will be observed—

1st That cholera did not prevail in the Sirhind Division until after the pilgrims from Hurdwar had entered and passed through the district.

2nd. That the first persons taken ill with cholera in Umballa were natives living in the bazaars close to the Grand Trunk Road, into which several pilgrims had found their way early in April; and that the first regiment in Umballa in which the disease appeared was that (the 94th) occupying barracks close to this road, along which it was positively ascertained that Hurdwar pilgrims had passed before. Measures to stop them (as recommended by the Deputy Inspector-General, Her Majesty's Indian Service, in medical charge of the division at the time) had been put in force; and that the barracks of this regiment is close to the native bazaar, in which the first cases of cholera appeared.

3rd. That of the *two* Europeans first taken ill at Umballa, *one* had passed through a body of these pilgrims, and had spoken to and mixed with them (a soldier of the 11th Regiment), and that the other (a soldier of the 94th Regiment) had been for a whole day in that man's company.

4th. That moving out of barracks into camp, and changing ground frequently, moving short distances, were successful in arresting the spread and continuance of the disease.

5th. The season altogether was a most unusual one. The early part of it was remarkably cool. The rainy season began early, continued long, and the amount of rainfall exceeded the ordinary average.

In every cholera camp the men had their cots, and not more than eight men occupied a tent, except in the case of the 82nd Regiment. In the head-quarters' camp, 10, 12, and in some cases even more were in one tent; but this was only for a short time, and the inconvenience was soon obviated by sending back *two* companies and a number of married men into barracks, and by procuring a supply of tents from Ferozepore, by order of the Major-General.

In the 94th Regiment no particular class of men was chiefly attacked, some were weakly, some robust, and several were drunkards; so says the Assistant-Surgeon lately in charge.

In the 21st Hussars all attacked by the disease were weakly, and had been suffering previously from debilitating diseases, as fever and diarrhœa.

In the 90th Light Infantry all attacked were weakly; for I consider that the whole regiment was in an an anæmic, nay feeble state.

The man who died at Kussowlie of cholera had been drinking for some days before his illness and death, and I am aware that several children who suffered from choleraic diarrhœa at that station had been eating too freely of unripe fruit.

All the men of the 82nd Regiment attacked by the disease were of temperate habits, and all save *three* are reported to have been in good health at the time of them having been taken ill.

Dr. Scott was in bad health, and had been complaining for nearly a month before he was seized with cholera, and had had diarrhœa for at least one day before he became ill with decided cholera.

The total number of cases and deaths were as follows:—

	Cases.	Deaths.
Royal Horse Artillery	1	1
21st Hussars	5	3
94th Regiment	21	18
Convalescent Depôt, Kussowlie ..	1	1
90th Light Infantry, Subathoo ..	43	28
82nd Regiment, Jullunda	19	15
Total	90	66

The G Batt. 19th Brig. Royal Artillery, the detachment 82nd Regiment at Phillour, and the 104th Regiment at Dugshai were exempt from the disease altogether.

The above numbers include men, women, and children. Cases of choleraic diarrhœa are not included in these numbers.*

* The details of treatment are omitted, but it may be mentioned that Dr. Munro adverts to a circumstance related by Surgeon Boyd, 90th Regiment, to the effect that all cases treated by him in one of the passages of his hospital, through which a strong current of air always rushed, recovered. Could the constant and rapid expulsion of foul air and choleraic poison by fresh pure air have had any beneficial influence on these cases?

APPENDIX No. XLII.

REPORT ON CHOLERA IN THE OUDE DIVISION AND ROHILCUND DISTRICT FOR 1867.

By Deputy Inspector-General J. H. K. INNES, C.B.

IT is difficult in a country like India, where cholera may be pronounced to be endemic, to ascertain exactly where an outbreak of the pestilence has its origin.

There can be no doubt that when crowds of human beings are aggregated at certain seasons, a nidus is formed for its development, and it seldom fails to establish itself amongst them, and to assume an epidemic constitution of greater or less force in proportion to the defective hygienic conditions present. Under such circumstances no external leaven is needed. A single case occurs, and almost simultaneously it is found that the ferment has infiltrated the mass, and men detached from it before its epidemic character has visibly declared itself, carry with them its taint, and often then become agents from which a fresh zymotic action radiates. The earliest detail of the appearance of cholera in this district of India, for the present year, is to be found in a letter addressed to the Chief Commissioner of the province by Mr. Reid, Conservator of Forests. He says, "During the first week in January, Sir Jung Bahadoor's camp, with about 5,000 men, reached Buremdeo, situated immediately under the hills where the Sardah flows into the plains (and this river constitutes the boundary between Nepaul and Kumaow at this point), and previously to this cholera had made its appearance to the west of the Sardah. The disease appears to have proceeded due east from Kosheepoor, where I am informed the first symptoms became known at Ramnugger, Kaladoonjee, Huldwanee, and as far as Buremdeo. It appears to have caused some anxiety to the authorities, and intimation was at once sent to Sir Jung Bahadoor's camp, on its arrival at Buremdeo, of its existence to the west of the Sardah; and the advisability of preventing any communication with the inhabitants in our provinces and the people of his camp was suggested, with a hope that such a measure would save the latter. This apparently was found impracticable, as Sir Jung Bahadoor had come thus far to marry one of his sons to the daughter of the Rajah of Kasheepoor, and communication was of course at once opened between the inhabitants of the two provinces; but whether this caused the disease to spread to Sir Jung Bahadoor's camp I am unable to say. It appears conclusive that the disease was travelling as nearly due east as possible, for Sir Jung Bahadoor's camp marched along the foot of the hills from Singowlee due west, without any apparent symptoms of sickness, but immediately on its arrival at Buremdeo several fatal cases at once resulted. It appears that as soon as Sir Jung Bahadoor was convinced of the fact that cholera was in his camp, he marched back from Ducknea Baugh almost in the same tract he had come; and although the marches were of considerable length, yet the disease remained with the camp, which travelled over 200 miles in eleven successive days, *i.e.*, from near Buremdeo to the borders of Bankie; and the casualties which occurred during that march are said by the two agents to be as follows:—

At Buremdeo	67 to	80
Buremdeo to Jumooa	110 „	160
Jumooa to Chousaee	90 „	60
Chousaee to Heerapoor	60 „	80
Heerapoor to Boudi Boge	60 „	70
Boudi Boge to Jumooa Golah	50 „	70
Jumooa Golah to (*)	40 „	60
(*) to Kaitela	40 „	50
Kaitela to Golah Ghaut	30 „	18
Golah Ghaut to Dong	10 „	18
Dong to (*)	4 „	9
Total	561 „	675

"Average of the two numbers, 618, 8·08 per cent. of the total number represented to have been in camp when cholera broke out."

In the first week in April, cholera appeared at the native fair of Dabee Patan, in the Toolsepoor Pergunnah, to the north-east of the Gondah district, and near the foot of the hills. Twenty cases of the disease showed themselves nearly simultaneously, and the gathering at once dispersed. This thinly-populated district became afterwards a focus of the disease, 1,474 deaths having occurred between Bulrampoor and Toolsepoor alone. Southward from thence it seems to have spread over the Gondah and Baraitch district, becoming nowhere severe until the last week of April, at which time it showed itself at Fyzabad, appearing in the cantonments of that station on the 27th April.

But there is not wanting evidence to show that during the months of February and March, cholera was very prevalent all along the Himalayan Terai skirting the northern districts of Luckeempoor, Baraitch, Gondah, and Goruckpoor. It seems to have remained stationary in the villages of this tract, extending slowly and only becoming virulent in the plains to the southward towards the end of May.

I have endeavoured, from the Reports of the Civil Officers of Government, kindly placed at my disposal by the Chief Commissioner, to ascertain, as nearly as possible, the dates on which the disease first showed itself in the several districts of this province. The records, however, are so imperfect that I appealed to the Civil Medical Officers in the several districts for answers to a series of questions. An examination of their replies will show that, principally during the months of April, May, June, July, and August, the diseases appeared to have arisen from an endemic source in many districts almost simultaneously, and that the influence [illegible] existing in its spread was very slight indeed. The following is a brief sketch of its progress:—

Cholera was endemic in the Himalayan Terai during the month of January.

So-called sporadic cases of the disease were continually showing themselves at Bijnoar to the south.

At Lucknow itself its origin was very clearly sporadic. It appeared simultaneously in two institutions, the inmates of which were of necessity much isolated, and therefore specially removed from the sources of infection, viz., the Civil Jail and the Lunatic Asylum. This was on the 27th March. On the 3rd April other two cases were reported in the last-named of these, and on the 8th three more in the first. From the 6th June, mortuary returns from the city of Lucknow were regularly received.

Buckshee Taloo is a village 11 miles to the north-east, and on the high road leading to Seetapoor. Three cases were here reported on the 29th March. Between this village and the Jail no communication is traceable. On the same day Hameerpoor, Bunthra, Lal Nugur, and Hurdui, all were attacked; and the mortuary return also mentions the prevalence of a low form of typhoid fever, which at this period, in these places, seems to have been equally as fatal as cholera. Scattered examples of cholera continued to prevail over the entire district, and the city of Lucknow itself, between this period and the 1st June, occasionally remitting in intensity. Its direction at first appeared to be

* The names of these places were omitted in the manuscript.

easterly, and afterwards to have swept as a recurrent tide over the villages first attacked, moving in an opposite direction. Thus it was shown to prevail at Seetapoor, and at the adjacent stations of Shahjehanpoor, in April and May; but it was not until the month of August that the troops suffered.

One of the Medical Officers attributes its source to the Hurdwar fair. At Moradabad the first man attacked was a pilgrim who had come from thence; and both at Budaou and at Bareilly the disease commenced from the 18th April. This theory derives plausibility from dates. Of the other Medical Officers, one believes that Bijnoar was the source from whence it was carried to Hurdwar; one gives it an endemic source; and four others in charge of districts where it appeared later, attribute it to importation from various centres, where it was known to be pre-existent.

The first appearance of cholera amongst the European troops of these Commands was at Fyzabad on the 28th April; the last case there occurring on the 12th May. Three men, three women, and three children were its victims. There was no after return of the epidemic.

At Shahjehanpoor, a case occurred amongst the married families of Her Majesty's 36th Regiment on the 8th of May, and no further instances showed themselves until the 8th of August, when a fresh outbreak was experienced. At Moradabad and Lucknow the European troops suffered only during the early and subsequent dates of the month of August. In all instances, excepting that at Shahjehanpoor, the visitation was extremely light.

In the last-mentioned station, encampment was early had recourse to, but with very unsatisfactory results. A monograph which has been furnished to me by Staff-Surgeon Ball, very ably details the history and progress of this local outbreak. He says, "Sporadic cases of cholera have always been frequent amongst the native population of Shahjehanpoor. In April of the present year cholera was very prevalent in the surrounding districts especially in the tract of the pilgrims returning from the fair at Hurdwar. The cantonment was at this time surrounded by a *cordon sanitaire*; the troops were prohibited from entering the native city; the stream of travellers was diverted from it; temporary hospitals, attended by native practitioners, were established at halting-places; and the inhabitants of the city, who had visited the fair, were kept in strict quarantine. Notwithstanding these precautions, which were adopted by the Civil and Military authorities at my recommendation, a married woman of the 35th Regiment was attacked with cholera on the 8th of May, and died on the 9th. She was treated in a tent, and kept carefully separate from other patients. The whole of the married families vacated their quarters the same evening, and were encamped on an elevated site close to the cantonment."

With [illegible] into camp, the measure is justly [illegible] as one of such approved efficiency that there appears to be a [illegible] of a too prompt resort to it than any fear of supineness in adopting it. In the wing of Her Majesty's 36th Regiment at Moradabad, as well as amongst the married families in Her Majesty's 37th, 1st Battalion 11th, and 2nd Battalion 12th Regiments, the results which followed its adoption were most satisfactory. The only instance of an opposite character is found in the history of the detachment of Her Majesty's 36th Regiment at Shahjehanpoor, to which, for a number of successive marches, the disease clung with a tenacity altogether unaccountable.

The measures adopted in Her Majesty's 1st Battalion 11th Regiment are thus described by the Medical Officer:—

"As regards evidence of the disease having been communicated, my own opinion is that it was brought to the married quarters by the punkah coolies. The whole of the punkah pulling establishment supplied to the regiment came from the moveable column, except those for the married quarters, 18, 19, and 20 barracks. The moveable column, be it here observed, is a fixed establishment, maintained by the Commissariat for various duties within cantonments. During the hot season they are employed in pulling punkahs and watering callies. The natives forming this column lived within cantonment limits, and so, up to date of commencing punkahs, within a circle altogether free from cholera.

"The usual time for commencing punkahs is 15th of April, but it so

happened this year that a succession of dust and thunderstorms, with occasional rain, commencing on the 12th, lowered the temperature, so that artificial means were altogether unnecessary until the 24th. The punkah pulling establishment, however, had been collected on the 15th, but the coolies finding they were not called upon to work, stole away and dispersed to their homes in the neighbourhood. When required again on the 24th, they had to be hunted up from their villages; and as by this time cholera had become general around us, especially so in the Gondah district, on the other, or north side of the Gogra, there can scarcely be a doubt that some of them came from infected villages.

"Punkah pulling was commenced on the 24th of April at the married quarters; on the 27th the first case of cholera, or more correctly, choleraic diarrhœa, occurred. Similarly, in 1865, when the disease attacked the regiment, punkah pulling commenced on the 15th, and cholera appeared on the 18th, or three days after the exact time. I have on two other occasions witnessed the disease occur after undoubted communication with the infected.

"That this year the disease did not attack 18, 19, and 20 barracks, which were supplied with coolies from the same source as those sent to the married quarters, does not, I conceive, militate against the above conclusions; the poison required a nidus for its germination, and that it should have found this in the low, crowded, indifferently ventilated, and filthy (this last almost of necessity, in this instance, because of the children) married quarters, and not in the lofty, clean, well-ventilated men's barracks, with ample cubic and superficial space, need excite no wonder. Nor is the opinion materially opposed by the fact of a married couple (Private Joseph Mannelly and Sarah Mannelly) occupying the end room of No. 1 barrack, and with coolies supplied from the moveable column, being attacked. These people occupied one small room with two children, and they were notoriously filthy. They both recovered. The wife was first seized at three A.M., the attack commencing without any premonitory symptoms. She was brought to hospital at six A.M., removed into a tent, and attended by her husband, who was seized at three P.M. the same day. Was the disease communicated from wife to husband?"

Similarly, in the 2nd Battalion 12th Regiment, at Roy Bareilly, removal appears to have at once placed a check on its further extension. Three cases of cholera occurred nearly simultaneously in one barrack-room. Its inmates were removed to tents pitched at a short distance only from the infected building, and no others occurred.

In Her Majesty's 37th Regiment at Bareilly, the invasion was confined to the married quarters. The families from these were placed in tents pitched 100 yards in rear, or to the south. They remained [illegible] men, three women, and [illegible] had previously died from cholera. They remained under canvas from the 17th of August until the 6th of September, having once made up fresh ground in order to facilitate the proper conservancy of the camp. There were no cases under canvas.

The following extract from the report of Assistant-Surgeon Reid sketches the course of the attack at Seetapoor:—

"On August 15th the first case occurred in the 2nd Battalion 12th Regiment, which proved fatal in about 12 hours. The company the man belonged to was immediately moved into camp, and no more cases occurred in it. On the 18th, a woman was attacked, and died on the sixth day of uræmia; a child died the same day, after 15 hours illness. All the families in the same building were sent out into camp on the 22nd. A man belonging to the 2nd Battalion 12th Regiment, attached to the Royal Artillery Camp, was seized with cholera and died. On the 25th another man was attacked, and died in 25 hours, and his company was also sent out into camp. No fresh cases occurred up to the 9th of September, when a boy belonging to the band was attacked, but recovered, and the next day a woman was attacked, and after several hours recovered. About a week afterwards she was delivered of a healthy child. On the 12th all who were remaining in Barracks were sent into camp, in order to allow the barracks to be thoroughly cleansed and purified. Up to this date occasional cases occurred

among the native population in the neighbourhood, but after this no fresh cases occurred in the regiment."

At Lucknow the outbreak amongst the troops in the month of August did not amount to an epidemic invasion. Cholera had long been rife in the native town, but early in August it rapidly subsided. It was after the date of this subsidence that the troops first became affected. In Her Majesty's 55th Regiment there were four cases, the first appearing on the 9th August, the last on the 24th September. They are thus described by Surgeon-Major Parr :—

"The first, a married man, was admitted from No. 2 married barrack, and recovered. The second (a case of choleraic diarrhœa) was attacked in the regimental hospital, while under treatment for chronic rheumatism, and proved fatal. The third, a woman from No. 5 married barracks, also died. The localities in which the seizures severally took place, are at a considerable, in one instance remote, distance apart; and nothing like any transmission of the disease was at all apparent. They cannot, under all circumstances, be regarded otherwise than sporadic cases, isolated as they were, by time and space. As to the causes, they were obscure; if not regarded as local, they were not epidemic; and from the extensive range of the visitation must be referred to a general origin. The rain-fall during the season was unusually copious; and the country in the vicinity of the Goomtee became inundated. The native population suffered severely, although but three cases appeared in the establishment of the regiment, one of which proved fatal in the civil hospital. Fortunately, from the small number of cases, little can be gained by comparing the proportion attacked in the different classes. The following, however, are the numbers :—

Single men to strength	..	..	..	..	0·29
Married ,,	,,	..	..	..	0·13
Women	,,	..	..	..	1·09

In the Royal Artillery division there were three cases. Surgeon Guthrie remarks—

"That all were of a sporadic nature is evidenced by the following facts :— A. A considerable time, comparatively, elapsed between each seizure, the first case having occurred on August 25th, the second on August 27th, and the third on September 1st. B. The cases occurred in widely distant parts of the Royal Artillery lines; the first patient having been a driver of C Battery, A Brigade, Royal Horse Artillery, who was quartered in the barrack on the extreme south of the lines. The second was that of Assistant-Apothecary Cullen, who was seized in his quarters, which are in the immediate vicinity of the hospital, and on the extreme west of the lines. The third case was that of a Sepoy, and lived in the married quarters of his battery, which was married on the north-west of the lines. These three points are at least half a mile distant from each other. As to the apparent source of the disease in the first case, the patient, Driver Norcord, had suffered from premonitory diarrhœa for two days before decided choleraic symptoms made their appearance. During this time he entirely neglected to apply for medical aid, and in fact, so slightly did he regard his sickness, that he went out shooting on the afternoon prior to the morning on which he died. The companions of his shooting excursion state, "that while they were out, Driver Norcord suffered much from heat and thirst, and drank water from a small stagnant pool in the jungle." This water could hardly fail to be in a very impure state, and may have been the means of conveying to a system, already predisposed for its reception, by diarrhœa of 48 hours duration, an amount of material poison that quickly converted the case into one of decided cholera. In the second case, that of Assistant-Apothecary Cullen, it is possible that the disease may be attributed to his unremitting attendance upon Driver Norcord, for Mr. Cullen was not in good health, having for some time previously been suffering from diarrhœa of a chronic nature, and which had a dysenteric tendency. In the third case no satisfactory evidence of any source can be obtained. The man was the Canteen Serjeant, and had been at his duty to within a few hours of his being brought to hospital in a state of collapse.

Among the natives attached to the Royal Artillery division, whose huts are in the lines, two cases occurred. The first, a syce, was brought to the hospital on the 14th of August, and the disease was in such an advanced stage that the man died before he was seen by the apothecary. In the second case, the patient was a hospital servant, and he died on being removed to the special cholera hospital in the city of Lucknow. This happened on August 31st. No evidence of the communicability of the disease can be said to have been fairly established. It is, however, possible that some connection may be traced, for Mr. Cullen, as the Assistant-Apothecary of C Battery A Brigade was in almost constant attendance upon Driver Norcord, and, as already stated, was unfortunately in a state of health that rendered him liable to the reception of the disease. No connection whatever could have existed between any of the other cases. The Serjeant of 3rd Battery, 22nd Brigade, Royal Artillery, whose case formed the last, had not been near any of the former cases that had occurred before his own. No evidence exists of the disease having been communicated to him by others.

The first case in Her Majesty's 5th Lancers was a woman who was attacked in barracks on 31st August; she expired in nine hours. The second case was a patient in hospital suffering from dysentery. She was seized at 4 P.M. the same day, and succumbed to the disease at 7 A.M. the following morning. The third case was daughter to the last woman. She was attacked in barracks; four days afterwards the disease lapsed into the second stage, but she eventually sank a victim to it on the fourth day from first attack. The fourth, the Assistant-Apothecary, has recovered, although he is still very weak, and obliged to remain in hospital for further treatment. He was attacked on the 3rd September. The last case, Cornet McNamara's child; it died three hours after seizure."

The visitation was more severe than any of the above in Her Majesty's 46th Regiment. The total number of cases amounted to 10, the first on the 2nd of August (the exact date of the marked subsidence of the disease in the city), being a patient in hospital. On the following day, two of the inmates of a married barrack were attacked. The building was at once vacated, and the inmates were encamped close to it.

All subsequent instances of the disease were amongst the married people; but with the exception of one family, in which the mother and a child both died, they appeared in different quarters. On the 10th of August, it ceased in this corps with the same suddenness with which it had begun. Staff-Surgeon Griffin had proposed to encamp the entire regiment, of which he then had medical charge, a step which appeared to me to be premature, and although camps were formed in readiness for the emergency, it was not found necessary to use them.

In fine, the ... have attended the practice of ... been highly satisfactory, and although the experiment has been made at ... of the most inclement seasons of the year, and has involved considerable exposure to the men, the ratio of sickness amongst them subsequently has been actually less than that which has obtained amongst those who remained undisturbed in their barrack rooms.

Both at Seetapoor and Shahjehanpoor, where encampment was practised, the men carried with them their coats. Eight persons only were apportioned to a tent. All hygienic conditions, as well of conservancy as of clothing and food, were enforced, and in so far as was practicable, communication with the neighbouring village, was interdicted.

That the persons first attacked with cholera were brought more than others in contact with the natives, does not appear to be proved. Surgeon Tulloch indeed surmises that the few cases amongst Her Majesty's 1st Battalion 11th Regiment originated with the punkah coolies, but in no other instance is any similar assertion made, nor can any case be instanced in which a primarily infected barrack was in more immediate proximity to a native bazaar than the other buildings used by the troops.

At Seetapoor, as already noted, there is one quarter, the objectionable situation of which has been often represented. It is within 60 yards of the Sudder Bazaar, which again is ill-drained and foul from a stagnant pond. From this building the first case of cholera which was observed in Her Majesty's

2nd Battalion 12th Regiment, was derived; but 11 days before its occurrence, the far end of the range, at that time occupied by the Artillery, had presented cases, and the occupants had been encamped in consequence. There does not appear to be a reasonable doubt that the hygienic conditions of the situation had far more to do with the occurrence than any source of infection.

It has been shown that at Lucknow the earliest cases which were treated originated on nearly the same dates amongst the prisoners of the Central Jail and the inmates of the Lunatic Asylum. Their occurrence was most capricious; no one ward became affected, but sporadic instances, at intervals of some days, cropped out. Here the circumstances of the occupants render it difficult to imagine that the disease should have had an extrinsic origin.

A belief, which appears to be well grounded, is very generally entertained in the West Indies, that an epidemic of yellow fever amongst the native population is rarely contemporaneous with a similar visitation amongst Europeans. The experience of the past season in this respect offers another of the many analogies which exist between the two diseases, and helps to demonstrate that season, rather than contagion, is one of the chief factors in the production of both.

It would nevertheless be absurd to deny that the flood of tainted pilgrims returning from the Hurdwar fair was not also an important element in the propagation of the disease. Hurdwar, where nearly 3,000,000 of human beings were aggregated, offered a nidus for its development; and although but little of a marked epidemic broke out in the place itself, so soon as the masses began to disperse in diverging streams, cholera showed itself. The frightened crowd pressed homewards by daily marches of 20 to 30 miles, poor, ill-fed, and badly clothed, foot-sore and weary, they were in a condition most fit to become its victims. By the wayside their path was marked by death, due as often to simple exhaustion as to the diarrhœa which so commonly follows it, and a wild terror was spread amongst the villages past which they hurried.

At Moradabad, the detail of the outbreak amongst the native troops is thus given by Assistant-Surgeon Brown:—

"On the 18th of April, a Sepoy, belonging to the native corps stationed here died of cholera; this man had returned from Hurdwar fair on the previous day in a state of great exhaustion, having made forced marches with little but parched grain to eat. This man's death was followed by several others in the same corps, and the regiment was put under canvas just outside the station. At the same time the disease made its way into this city. The Civil Surgeon informs me it never became very severe. It was very difficult to get at the real facts, as so many natives avoid the City Dispensary, and lie down and die [illegible] natives state that for a time there were a great [illegible] Many new cases occurred in cantonments amongst officers' servants, &c., but these men when attacked generally set off to the town, and were never seen again."

The last case amongst the men of the native corps occurred on the 3rd of May. Meanwhile, the wing of the 36th Regiment remained free from the scourge. Very stringent measures of quarantine were introduced by the local authorities in view of diverting any stream of infected pilgrims from the towns and villages, and isolating such places as had already become tainted. Hospitals were established on the high roads, and food and medicine freely distributed; but in Oudh at least the protection thus given was to a great extent ineffectual. The pestilence moved as a wave across the province, at first from N.W. to S.E. in February, April, and May, when a recurrent tide seemed to flow in exactly the reverse direction.

It is difficult, in the absence of any reliable meteorological observations throughout the province to state accurately what were the deviations from the normal conditions of the weather. One main fact, however, is certain, that the early months of the year were marked by periods of great atmospheric disturbance. That the hot and dry season was at first deferred, and afterwards interrupted by storms of dust, of rain, and by marked electric tension, that the rainfall was excessive, and that the disappearance of the

epidemic was in a great degree coincident with the complete establishment of the S.W. monsoon. All the accounts received from the various districts agree in this particular with singular uniformity, and serve to corroborate the belief that violent atmospheric changes offer the most favourable conditions for the devolopment of the disease. This was illustrated in a marked manner at Fyzabad two years since, when that station was garrisoned by Her Majesty's 35th Regiment. After a storm of dust had passed by, the inmates of one of the hospital wards became sensible of a mal-odour so offensive that all the windward doors were at once closed, in order to exclude it. Within an hour from the time when it had first made itself felt, three cases of cholera (the disease not having been pre-existent) had developed themselves in the same ward.

In the earlier years of my service a severe and sudden outbreak (afterwards well described by Surgeon Thom) supervened in Her Majesty's 86th Regiment at Kurrachee, on a heavy thunder cloud bursting over the station, an incident strikingly similar to that mentioned in the addenda to the Hurdwar Cholera Report.

The mere amount of rain-fall would not appear to influence the extension of cholera in those places which may be said to be its ordinary habitat, and the comparative meteorologic Tables which are given by Dr. McPhearson in the "Medical Gazette," November 23rd, 1867, assist in illustrating this fact.

His observations were founded on data extending over a period of 14 years, and they are borne out by much that has recently passed in review, and go far to establish the important part which season plays as an agent of the factors in the production of cholera.

In conclusion, I regret my inability to report that the limited experience of those medical officers under whose notice the disease has of late been brought, has originated anything new, either in the etiology or the therapeutics of cholera; nor does a diminished mortality amongst those attacked in any way evidence that its management has been better understood.

APPENDIX No. XLIII.

REPORT OF EPIDEMIC CHOLERA IN 1867, IN THE PUNJAUB, NORTH-WESTERN, AND CENTRAL PROVINCES OF INDIA.

By Assistant-Surgeon SUTHERLAND, 5th Lancers, Statistical Officer to the Inspector-General.

THE epidemic of cholera during the past year (1867) in the Punjaub, the north-west, and central provinces, furnishes material for profitable investigation into some of the circumstances which may be considered as having led to the outbreak of the disease, and influenced its progress. Without entering into the complex, but interesting question of the effects of season as one of the great agents in the production of epidemic cholera, we know that its diffusion is greatly aided or retarded by meteorological changes. Previous to the outbreak of the disease at Hurdwar, we are informed that certain atmospheric irregularities did occur, such as would tend to favour such an outbreak.

On the 11th April a strong wind blew and passed over Hurdwar, followed by heavy rains, to which the pilgrims were exposed, and on the 13th eight cases of cholera occurred amongst them. In an enquiry, having for its object to determine and assign some cause for the outbreak and progress of the disease, the question readily suggests itself—can we account for the prevalence of cholera in these provinces (the Punjaub, the north-west, and central), compared with the other districts in Bengal? In eastern and lower Bengal we know that cholera has been prevalent for many years, and this would in some measure render its sudden outbreak near the Ganges less a matter of surprise; and we find at the "Gate of the Ganges" (Hurdwar), an outbreak of the disease amongst the mass of pilgrims about to return to their homes.

The official reports of the epidemic from the medical officers in the Gwalior, Sirhind, and Lahore divisions, with extraordinary unanimity agree that the centre, from which all the initial cases occurred, was through the pilgrims on their return to their homes; and as favouring their statements, we know that the districts in which the disease first showed itself, were those in the main track of the pilgrims. When it was reported that cholera was prevalent amongst the pilgrims, the authorities at the different stations through which the pilgrims would have passed, unless otherwise prevented, had cordons of police placed three or four miles from cantonments; yet in some instances before such could be fully [illegible] few of the pilgrims had entered, and cholera was the [illegible] result. This was the case at Umballa. Deputy Inspector-General Munro states it as his opinion that no case of cholera had occurred at Umballa until some of the pilgrims had passed through the station, and that the natives living in the bazaar, close to the Grand Trunk Road, were the first attacked with the disease, and subsequently the men of the 94th Regiment, whose barracks are not many yards distant from that road.

The medical officer at Subathoo distinctly avers that, until a woman of the 90th Regiment had met some of the pilgrims near that station, no case of cholera had occurred in the regiment. This woman was attacked with cholera on the following day and died; her attendant also was attacked and died. Deputy Inspector-General Jephson states that in no instance was it known that cholera appeared in any of the villages along the Grand Trunk Road in the Lahore division, until the half-starved pilgrims had passed through. So far we are able to throw some light on the outbreak of the disease as it occurred in these divisions, and also pointing out very clearly the "communicability" of cholera. We are, however, unable to trace any chain of communication between the Hurdwar pilgrims and the initial cases of cholera at Allahabad or Pethawar.

One of the characteristic peculiarities of cholera in certain localities is "its irregular migrations, its dying after a while, and partial revivals under certain atmospheric influences;" and at Allahabad the disease is known to occur annually after the setting in of the "rains," and the disease appeared in

that station at a time when the natives in the neighbouring villages had a perfect immunity from it.

Meteorological changes, as we have stated, aid or impede the diffusion of cholera, and we find that on the 19th May a severe and prolonged dust storm visited the station, and as four cases occurred on the following day, we may, with every degree of certainty, state that this was the method of the "invading cholera" of Peshawur, as previous to the advent of this storm, the general health of the troops was good. The first case occurred in the barracks on the right flank of the artillery lines, and gradually extended itself on the left towards the 77th barracks; on the 23rd May the first case occurred in the city of Peshawur, then in the adjoining villages, and subsequently in the civil population of Kohabattack, Rawul Pindee, and Umree.

As accounting for the outbreak of the epidemic at Meerut in the month of August, Deputy Inspector-General H. Gordon records it as his opinion "that the epidemic travelled from Moradabad, about 80 miles to the east of Meerut, as the 36th Regiment there had suffered a few weeks before, and there was a strong and persistent easterly wind blowing at the time." We may infer from the history of previous epidemics, that after the setting in of the "rains," and the soil has acquired a certain degree of moisture, we must not be surprised if cholera does break out in districts previously affected.

At Meerut we have an outbreak of the disease on the 15th August, when two men of the Royal Artillery were attacked and died. On the 17th the disease appeared amongst the men of the 1st Battalion 3rd Buffs, and the persistency with which it continued to affect the men, women, and children of that regiment contrast strongly with the comparative immunity enjoyed by the other troops at Meerut. Notwithstanding the frequent movements of the regiment from one encamping ground to another, and the breaking up of the regiment into detachments, it was not until the 9th October that the regiment was free from the disease, and the proportion of deaths (138) to cases (162) shows a very high mortality.

The Medical Officers are unable to assign any cause for the prevalence of the disease amongst the men of the Buffs. The men attacked were not more predisposed by reason of previous sickness nor from habits of intemperance than their comrades; and no local sanitary defects have been mentioned at favouring the outbreak of the disease, or aiding its progress in the barracks occupied by the Buffs.

The enquiry naturally suggests itself: were there any local sanitary defects known to have existed at the different stations where the epidemic prevailed which would have generated the disease or influenced its diffusion, and what was the state of the health of the troops previous to the outbreak?

It is a fact generally understood and appreciated, that the human body is, when in a debilitated state, rendered more than usually susceptible of disease, and the reports of the administrative Medical Officers clearly point out that the health of the men of the 90th at Subathoo, and E Battery, 19th Troop, Royal Artillery, at Peshawur was in such a state.

Deputy Inspector-Genreal Munro states that the men of the 90th, when seen by him in August, were very weak and anæmic, rendering it necessary for him to recommend the daily administration of quinine to each man until some improvement in their condition took place.

Deputy Inspector-General Summers states that of the force garrisoning Peshawur, the E Battery, 19th Troop, Royal Artillery, more especially had suffered from "fever," and had become anæmic.

Since the arrival of the 77th Regiment in this country it has been particularly unfortunate, as at Calcutta, Bagghat, and Allahabad, it has suffered severely from cholera. Four months after the arrival of the regiment at Peshawur, it had to be moved into camp on account of the rumoured condition of the barracks.

Deputy Inspector-General Munro states that the barracks of the married families at Subathoo were in a very wretched state, and the partitions of mud and clay, which must necessarily have absorbed damp and moisture, tended to affect the health of their occupants. In none of the "reports" are there any "strictures" reflecting on the quality of the water drunk by the troops, and their rations were good and nutritious.

The sanitary measures recommended by one Medical Officer with the view of arresting the progress of the disease may be said to have been carried out in their entirety by the others.

When cholera broke out in a regiment or detachment, the first matter invariably thought of was to have every arrangement complete which could assist or facilitate the removal of the affected corps into camp in the event of such being found to be necessary. On the occasion of a first move of a regiment or battery into camp tents were pitched on the encamping ground in the evening, ready for their reception on the following morning, and before starting each man had a cup of coffee. The men's cots were brought into camp.

The several Medical Officers are of opinion that the moving of the troops into camp and frequently changing ground, were very powerful auxiliaries in arresting the progress and continuance of the disease. The purity of the water drunk was strictly looked after, and a plentiful supply was invariably afforded to the troops.

The men were strictly prohibited from entering the neighbouring villages, and cautioned that in the event of looseness of the bowels, they were immediately to apply for relief. While in camp such amusements as were conducive to health were set on foot. In cantonments the authorities were recommended to have the barracks and hospitals in which the cases of cholera occurred fumigated and limewashed, and this was carried out. The barracks, lavatories, and latrines, after having been well cleansed, were sprinkled over with disinfecting fluids. The "bed-pans," or "night-stools," into which the evacuations of cholera patients were received, had always a sufficient quantity of disinfecting powder or fluids placed in them.

As regards the curability of cholera, none of the Medical Officers has been able to communicate anything satisfactory. The premonitory diarrhœa which is often prevalent during cholera epidemics, has been treated by the administration of the ordinary astringent and stimulant remedies, and the presumption is very strong that their success in this respect in many instances, at least, prevented the disease from running on to true cholera.

The treatment of the disease in its different stages appears to have been vigorously carried out by each Medical Officer according to the views he entertained of the different medicines as curative agents.

On looking at the proportion of deaths (425) to cases (643), it is very clear that medicines were of little avail in the treatment of the disease, and we must confess that we do not know of any medicine which can in any sense be brought forward as a cure for cholera; and if it be true, as asserted by competent medical authorities, that in the true choleraic condition, absorption does not take place, medicines ought to be withheld altogether. Such a high mortality indicates very strongly that cholera continues to be a pestilence of very great magnitude, and calling "for further investigations being made, with the view of arresting (if possible) its epidemic invasion."

Judging from the late and previous epidemics in this country, we may, with every degree of certainty, affirm: 1st, that the initial cases of cholera are, as a rule, fatal; 2nd, that the disease attains its maximum degree of severity and prevalence on or about the 10th day; 3rd, that cholera has its period of inception, increase, decline, and decay, and all within a period of 20 days (such hitherto has been generally the case); 4th, that, when the disease is on the "decline," patients have a better hope of recovery; 5th, that it attacks individuals irrespective of their age, sex, or habits; 6th, that the drinking water, which has been stated to have been the cause of many epidemics of cholera in certain countries in Europe, cannot be said to apply to the disease, as it occurred in this country in 1867; 7th, that we know of no medicine which can in any sense be said to be a cure for a patient in the true choleraic condition; and lastly, that the moving of the affected corps into camp and changing ground frequently have been the most powerful auxiliaries in arresting the progress and continuance of the disease; yet, in some instances, as will be seen, regarding the regiments and batteries in the accompanying "report," that the encamping and frequently moving the affected corps have not been attended with those favourable results which we have been led to expect, judging from their success during previous epidemics; and the cause of this is as yet unknown.

A MAP SHEWING THE PROGRESS OF PANDEMIC WAVES. BY ROBERT LAWSON, INSPECTOR GENERAL OF HOSPITALS.

EXPLANATION.

This Chart shows the limits, and rate of progress of Pandemic waves, in their course from South to North. The lines are those of equal magnetic dip, or Isoclinals, for 1846, and have been selected to indicate the position of the advancing edge of the waves on 1st January each successive year. The inflections of the Isoclinals move to the westward gradually, maintaining nearly the same relative position to the parallels of Latitude. Their position at present (1847) is to the westward of that given on the Chart.

The Pandemic waves recur every second year, and the advancing edge of the wave is always felt in each of the Zones, marked out by the Isoclinals, either in a year with an odd number, or in a year with an even one. As regards fevers, the advancing edge of the wave is, on first January of the

Odd Years.		Even Years.			
At Isoclinal	70° S.	53° S.	At Isoclinal	Odd Years. 30° N.	Even Years. 53° N.
"	30° "	0° "	"	70° "	80° "

As regards cholera, the advancing edge of the wave is, on 1st January of the

Odd Years.		Even Years.			
At Isoclinal	70° S.	70° S.	At Isoclinal	Odd Years. 0° N.	Even Years. 30° N.
"	30° "	30° "	"	53° N.	70° "

The waves are supposed to pass over each Zone with an equal motion, so that their position may be found out at any time and the period when they would reach any given spot determined approximately by simple proportion.

APPENDIX No. XLIV.

OBSERVATIONS ON THE INFLUENCE OF PANDEMIC WAVES IN THE PRODUCTION OF CHOLERA.

By Inspector-General LAWSON.

SOME remarks were published in the Sanitary Report of the Army for 1864, developing the limits, period, and rate of progress, of pandemic waves, as regarded fevers; and their connection with terrestial magnetism. A map accompanied these, in which the position of the advancing wave was indicated for 1st January each consecutive year, by lines of equal magnetic dip. These marked out a series of zones extending round the earth, each of which the wave overspread in the course of a year in its progress northward. As the period was a two-yearly one, the first part of each wave was found in alternate zones in the odd or even years respectively, but in the same zone always in an odd, or always in an even year. Thus the wave was shown to start on the 1st January of the—

	Odd Year.	Even Year.
From Isoclinal	70° S.	53° S.
„	30° S.	0°
„	30° N.	53° N.
„	70° N.	80° N.

The outbreak of febrile epidemics was found pretty constant as to the period of the year in each locality, though these differed a good deal among themselves in this respect; and, if any given station were situated in its zone so that the wave would reach it before the usual season for the appearance of fever, it experienced its most severe epidemics in the same year, if placed so that the wave reached it after the febrile period had passed, the epidemics were found to manifest themselves the following one. That paper was confined to the application of these principles to the explanation of febrile epidemics, the object of this is to show how far they are applicable to those of cholera.

I. FORMS OF CHOLERA.

Cholera, as is well known, presents three different forms—viz., (1) That of simple cholera, with bilious vomiting and purging, cramps, and but moderate, if any, collapse: this seldom proves fatal. (2) That of a more developed variety of the disease, with watery purging and vomiting, cramps, lividity and shrivelling, with moist clammy state of the surface, collapse, and frequently terminating fatally, but with the cases appearing sporadically, and scarcely ever in numbers deserving the name of an epidemic. (3) The epidemic form, characterized by watery purging and vomiting, collapse, more or less complete suppression of urine, change of voice to a hoarse whisper, rapid course, and great mortality. Many writers maintain that the last form is specifically different from the others, and that it is contagious, and never occurs but as an epidemic. I have, however, met both in the West Indies and at Sierra Leone with sporadic cases, in which, with the watery evacuations, and the cold, blue, moist, shrivelled surface, the pulse was not only scarcely perceptible, but the urine was suppressed, and the voice a mere whisper; cases, in short, undis-

tinguishable from the epidemic form of the disease. I am, therefore, prepared to accept the opinion of Indian practitioners, that many cases of sporadic cholera are essentially the same as those which occur during an epidemic, though, for reasons which at present we cannot assign, the disease does not become generally prevalent.

Whether cases of simple cholera, and all those which appear sporadically, however, are of exactly the same nature with the epidemic form, admits of doubt. They have such a strong general resemblance that they are all named cholera, as intermittent, remittent, and yellow fevers are placed in the category of fever, and it is very probable effects so similar may, as in the case of these fevers, have something common in the cause; but inasmuch as there are cases of cholera in which the evacuations may be watery, and attended with considerable collapse, which nevertheless have not suppression of urine, or alteration of voice it is quite possible that those cases which present suppression of urine may have something superadded to the ordinary cause of the milder forms, which leads to implication of the kidneys, as in the parallel case of yellow fever, in which diminution of urine, with albumen and tube casts in it, are characteristic symptoms at a certain period of the disease, while in pure intermittent and remittent fevers they are not met with. Whatever weight this remark may be deemed worthy of, it will be seen hereafter that when cholera has prevailed in an epidemic form in one locality, others in the same zone, often at a great distance from the first, have shown an unusual amount of the disease, either sporadically, or in one of its milder forms, exactly as we have seen yellow fever epidemic in one place, and others in the same zone displaying the less severe forms of remittent or intermittent.

Cholera itself may even present similar characters within narrow limits: thus, the millesimal ratios of admissions and deaths among the troops in Mauritius, from the common and epidemic forms of the disease, were in—

	1818.		1819.		1820.		1821.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Cholera, common ...	4·5	·6	6·7	...	4·3	...	3·1	...
,, epidemic ...	...	...	68·5	12·3	111·1	8·6	...	...

Common cholera was thus met with in each year, and if the extremely low ratio of mortality in 1819-20, when the epidemic form prevailed, be considered, it is difficult to avoid the conclusion that many of the admissions must have been from the milder forms of the disease. The deaths among the troops elsewhere, up to 1836. were—

In United Kingdom	1 in 3¼ attacks.
In Gibraltar	1 in 3½ ,,
In Nova Scotia	1 in 3½ ,,
In Canada	1 in 3 ,,
In Honduras	1 in 3 ,,
In Ceylon	1 in 3 ,,

though in all these instances it is probable there were many cases of the milder forms included. In what follows, therefore, all forms of cholera will be taken together to indicate the progress and extent of the cholerific influence, though it is not thereby intended to assert their absolute identity.

II. The Season at which the Mortality occurs at each Station.

As with fever, it is necessary to have a knowledge of the season at which cholera prevails at the different places which will come under review. Taking these in the order in which the waves proceed, Mauritius comes first. Here the epidemics of 1819-20, and 1861-62 commenced in the end of November or beginning of December, and, attaining their maximum in January, declined in February, and disappeared about the end of April. The epidemic of 1854 commenced in middle of May, was at its height from the 4th to the 15th June, from which it declined; but at the end of July there were still from three

to four deaths daily. In 1859 an outbreak commenced on 11th October, and terminated on 24th November. It re-appeared on 15th December, and by the end of February following the island was again clear of the disease.

At Cape Town, the quarters ending in December and March had the greatest number of admissions, that ending in September very few. On the frontier the March and June quarters have shown the most admissions.

In Ceylon, cholera seems to have prevailed at two periods of the year. Commencing in January or February, it reached its culminating point about the end of March, from which it declined, cases sometimes continuing till August. Later in the year it has appeared in November and December, chiefly at Trincomalee. In 1832 there was a very severe outbreak at this place, which commenced on 12th October, culminated on 23rd and 24th, and almost disappeared by the beginning of November.

In the southern part of the Madras Presidency the disease has appeared both in the early part of the year, mostly during the hot weather preceding the commencement of the south-west monsoon, and again in autumn, between the cessation of the south-west, and commencement of the north-east monsoon. Towards the north it seems more concentrated in the middle of the year, during the hot season.

As regards Bengal, and the north-western provinces, the period of prevalence is pretty well indicated by the number of deaths from the disease each month, at Calcutta, among the Hindoos and Mahommedans, from 1832 to 1838 inclusive (Martin, "Influence of Tropical Climates," p. 558), and those in the jails of Bengal and the north-west provinces, from 1844 to 1853 inclusive, by McKinnon.* The number of deaths recorded in the first of these lists is 18,115; in the second, 3,479; and in the last, 1,065. Assuming the total mortality at 1,000 for each, the deaths in the different months would be as under.

	In Calcutta.	In Jails in Bengal.	In Jails in North-west Provinces.
January	38	32	8
February	45	38	8
March	128	89	24
April	176	184	31
May	145	136	54
June	46	161	114
July	58	128	222
August	53	49	268
September..	50	27	114
October	68	42	78
November..	106	61	69
December	87	58	10
Year	1,000	1,000	1,000

These figures present a high mortality in the months March, April, and May, at Calcutta, corresponding with the hot season there; from June to September, during the wet season, the mortality is low; but in October, as the rains diminish, the temperature being still high, cholera becomes more prevalent again, and attains a considerable height in November, and even continues frequent into December, though the reduction of temperature is then considerable.

In the jails in the north-west provinces the course of the disease differs considerably from that of Calcutta. It is at a minimum in December, January, and February; there is an increase in March, from which it is nearly doubled in frequency each month to July. The maximum is attained in August; it then declines rapidly to the minimum in December.

The jails in Bengal, situated in the districts between Calcutta and the north-west provinces, present a course partaking of the characters of both. The minimum in January and February is not materially different from that at Calcutta.

* Chevers in Indian Annals of Medicine, No. X., p. 712.

There is the increase in March, with a maximum in April, and a fall in May; but, instead of this continuing into June, there is then again a considerable rise, and a high rate continues into July, though less than in the north-west districts. In August and September the deaths are few as at Calcutta, and there is an increase in October, leading into a maximum in November, though not so strongly developed as at that place.

In the upper part of the Punjaub the course of the disease from month to month presents still further peculiarities, which are well shown in its progress in the 93rd Highlanders, at, and in the vicinity of Peshawur, in 1862, as described by Dr. Munro, Surgeon of that corps, in the "Sanitary Report for the Army for 1862," p. 406, *et seq.* Cholera had shown itself among the natives in the Bannoo district, about 100 miles south of Peshawur, in April. In June it affected the Kohat district, between Bunnoo and Peshawur, and cases occurred in that town itself. The 93rd was then quartered at Peshawur, and in July was attached; there were four separate outbreaks during the season, as follows :—

	Cases of Cholera.	Cases of Choleraic Diarrhœa.
1. July 7th to July 17th there occurred ..	15	22
2. July 26th to Aug. 10th ,, ..	14	27
3. Sept. 9th to Sept. 16th ,, ..	9	2
4. Oct. 12th to Nov. 3rd ,, ..	63	..

Dr. Munro remarks, "each successive outbreak was of a more virulent character, and choleraic diarrhœa was far more prevalent during the first and second, than during the third and fourth outbreaks.

The weather in July and August was hot and oppressive, with southerly and westerly winds, and occasional heavy rain. The first and second outbreaks took place after rain. In September and October the weather continued hot and oppressive by day, followed by damp chilly nights. The fourth outbreak was immediately after a severe dust storm from the north-east. The third and fourth attacks were accompanied, and followed, by a good deal of periodic fever. The men were almost invariably taken ill at night, or very early in the morning.

The following seems to be the explanation of the varied effects. The temperature increases rapidly over the whole of the northern part of Hindostan, as the sun approaches the tropic; and, wherever the immediate exciting causes of cholera can be produced, the high temperature brings them into operation, and the disease results; but it is only under the influence of the more powerful part of the pandemic wave that a severe epidemic arises, and, consequently, the disease in its aggravated form appears later and later in the season as the locality is more to the north, and the wave longer in reaching it. Thus the advancing edge of the wave will be at Calcutta about 21st November; at Allahabad and Sylhet about 10th January; Lucknow, Oude, and Gouchpore, about 5th February; Delhi, about 1st March; Mooltan, Kurnaul, Almora, about 15th April; Ferosopore and Loodianah, about 1st May; Lahore, about 1st June; Peshawur, about 23rd July. And while the disease is most severe at Calcutta in March, April, and May, the jails in Bengal show in addition a high maximum in June; while in the north-west provinces it is carried on into July and August; and at Peshawur, though there may be considerable outbreaks in the early summer under the preceding wave, they gradually diminish as this leaves, and it is not before the accession of the next that the full force of the epidemic is developed. Were stations still more to the northward taken, which the advancing wave could not reach until the temperature had so diminished that the season for cholera had passed, there would either be no indication of the disease, or only a few scattered cases, until the increasing temperature of the following year brought round the conditions essential for its appearance in the epidemic form, exactly as was shown to be the case with fever in the previous paper. These principles

apply to that portion of the Indian peninsula between the isoclinals 0° and 30° N., as well as to that beyond 30°.*

In the Mediterranean and south of Europe, though cases may occur earlier in the year, the disease does not seem to have been general before May or June, and it attains its greatest force in July or August, after which it generally declines.

In London in 1832 there were a considerable number of attacks in March. They were at their minimum in May, from which they increased and reached their maximum in the end of July, and disappeared in November. In the epidemic of 1849 September was the sickliest month in London.

In Nova Scotia and Canada, and the neighbouring States of the American Republic, the disease has generally shown itself from May to June, and attained its greatest force in July or August, after which it declined, though cases have been met with up to November. In the southern parts of the United States the disease is met with earlier in the year.

III. Period of the Waves and their Influence in Exciting Epidemics.

Epidemics of cholera, though not unfrequently occurring in the year more common to those of fever at any given station, yet seem rather to present themselves in the following one, so that localities which come under the influence of the first part of the febrific wave in an odd year display their epidemics of cholera for the most part in the even one, and *vice versâ*.* Thus Ceylon in, which the excess of fever falls in the even year, had cholera epidemics in 1819, 1825, 1829, and 1832. In the zone commencing at the isoclinal 53°N., which experiences the first part of the febrific wave in the even year. Cholera first became epidemic in Portugal and South of Spain in 1833, and at Havanna, which is just on the border of this zone, early the same year. The disease was epidemic, at Marseilles in 1835, in Malta in 1837. In the next zone, commencing at the isoclinal 70° N.; it appeared at London, Paris, Quebec, and northern parts of United States in 1832, and again in 1834. London suffered again in 1848 and 1854. In the zone commencing at the isoclinal 30°N., Honduras was first attacked in 1836, Jamaica in 1850, the Windward and Leeward Islands in 1854. There appears then to be a difference between the influences which determine the epidemics of fever and of cholera; without endeavouring, at this stage of the enquiry to define what this may consist of, it will facilitate the investigation if we regard these for the present, as attributable to two waves, each with a two-yearly period, but so placed that the first part of the cholerific wave is always a year behind the advancing edge of the febrific one. Under this assumption the advancing edge of the cholerific wave may be taken to be, on the 1st January, in the—

	Odd Year.	Even Year.
At the Isoclinal	..	70° S.
„	53° S.	30° S.
„	0°	30° N.
„	53° N.	70° N.
„	80° N.	..

The position of these lines are given in the map accompanying this paper for the year 1840, as laid down by Sabine, in "Johnston's Physical Atlas."

Indian writers allude to several epidemics of cholera between 1769 and 1793, and there was a severe outbreak at Mauritius in 1775. The details regarding these within my reach, however, are too few to admit of their being used here with advantage. From 1793 cholera seems to have been comparatively rarely met with until 1814, though there were occasional indications of its causes resuming greater activity at various places. At Mauritius, from 1812 to 1817 inclusive, there were 137 admissions and 7 deaths among the troops, out of an aggregate annual strength of 19,273,† or in the ratio of 7·1 and 0·4 per 1,000,

* See Note A at end.

† Statistical Report on the Health of the Army at Mauritius Appendix xii. p. 290.

being more than twice the usual ratios there at periods when cholera was not epidemic. Unfortunately the admissions and deaths for each year are not given. The millesimal ratios of attacks from cholera among the troops at the Cape of Good Hope were—in 1808, 0·8; 1809, 2·4; 1810, 1·7; 1811, 2·7; 1812, 1·8; 1813, 2·4; 1814, 1·4. Here the excess in the odd years is regular and distinct; and as Cape Town, in the vicinity of which all the troops for which these ratios are given were quartered, was at that time just to the north of the isoclinal 33° S., the first part of the cholerific wave would reach it very early in the odd year. In 1812 there were 2 deaths from cholera out of 8 admissions.*

The strength of, and admissions and deaths from different diseases, among the European and native troops in the Bombay Presidency, from 1803 onwards, are given in an early number of the "Indian Annals of Medicine." The years terminate apparently on the 31st March; but as the chief cholera period appears to be April, May, and June, this will be of no importance in the present instance, as the mortality will appear in the corresponding year. From the data in the "Indian Annals," the following millesimal ratios for cholera have been calculated:—

	Europeans.		Natives.	
	Admitted	Died.	Admitted.	Died.
1803–4	..	...	..	..
1804–5	..	..	..	..
1805–6	1·9	..	0·6	..
1806–7	1·9	..	..	..
1807–8	3·0	..	..	..
1808–9	1·3	..	0·4	0·1
1809–10	8·5	..	0·4	0·2
1810–11	2·5	..	0·3	0·1
1811–12	1·1	0·2	0·6	0·1
1812–13	3·2	..	0·4	..
1813–14	6·7	..	0·7	0·2
1814–15	5·9	0·5	0·7	0·2
1815–16	5·6	0·8	1·2	0·3
1816–17	5·1	0·3	0·9	0·1
1817–18	3·8	..	1·0	0·2

These figures show a gradually increasing activity of the causes of cholera from 1808; and, whether from the more intense cause, or the greater liability to suffer from it in consequence of greater exposure, both an increased frequency and a greater mortality from 1814 onwards. In this year several cases occurred in a brigade which marched from Jaulnah on 29th May. There are returns for the white troops in Bengal from 1812, but these show no admissions from cholera before 1817. The first part of the cholerific wave would pass over Jaulnah about the middle of September in the odd year; and an outbreak, as in this case, might be looked for from April to June, or later, the following year. This wave, of which there was a distinct indication at the Cape of Good Hope in 1811, may thus be traced on to Jaulnah in 1814; but perhaps the most important fact connected with it, and one of the deepest interest as regards the causation of cholera, seems to have been entirely forgotten. After mentioning that Boyle, Johnson, Curtis, and Hitchcock had noticed its prevalence at sea, Corbyn states that he proceeded to India in 1814, in the ship "Mangles," and when at sea about two months, cholera burst forth with awful violence. In six weeks 64 died, and four, one after the other, just as the ship anchored in Table Bay.† On 1st January, 1814, the wave would pass the isoclinal 30° N., and, in the Atlantic, would be experienced to the north of a line from the mouth of the Amazon to Sierra Leone. There is no notice of when the "Mangles" sailed from England, or of her position at any period of her voyage. She could not have been very far from the Line, however, after being two months at sea, and in this neighbourhood she must have run into the wave which we have

* The materials for these from Returns in P. M. O.'s Office, Cape of Good Hope.

† Corbyn Treatise on Epidemic Cholera, Calcutta, 1832, p. 45.

seen was at the Cape in 1811, and in 1814 was manifesting its influence in the same zone in India. Other examples of ships at sea running into these waves, and their crews and passengers suffering from cholera in consequence, will be given in the course of this paper.

This wave would pass the isoclinal 53° N. on 1st January, 1815, but unfortunately there is very little information available as to its subsequent course. From data given by Hennen, in his "Medical Topography of the Mediterranean," the millesimal ratio of admissions for cholera, among the troops in the Ionian Islands, for the last five months of 1815, was 2·3; in 1816 it was 6·5, nearly all the cases occurring among the small force at Zante. On 1st January, 1816, the wave would pass the isoclinal 70° N. In the "Medical Report of the Sick Poor Institution in Dublin," from 1st November, 1816, to 31st October, 1817, there are entered, "Colera, 103,"* which shows this form of disease to have been frequent there in that year. In Table I it will be seen that at Bermuda, Nova Scotia, and Canada, there were numerous attacks in 1817, the millesimal ratios being 9·1, 6·7, and ·4 respectively, though this was the second year of the wave. From all these facts there can be no doubt that the causes of cholera, which had been comparatively quiescent for some years, had entered on a more active period about 1809; and contrary to the usual belief, that their influence was first manifested in a prominent manner in the middle of the Atlantic, in a ship proceeding from England, three years before the outbreak in the Delta of the Ganges.

Taking the next wave, of which there is the indication at the Cape in 1813, it would reach Bombay about the 6th of August, 1815, and the isoclinal 30° N. by 1st January, 1816. As the wave has a two-yearly period, it would extend at this time nearly to the isoclinal 30° S., embracing the Indian Peninsula and Ceylon. The ratios of attacks continued high among the European troops in the Bombay Presidency in 1815, and into 1816, though in the latter the mortality was less; and the disease still farther diminished the following year, at a time when it had become very active at Calcutta, and along the lower part of the Valley of the Ganges. In 1816 there were two deaths from cholera among the troops in the Kandyan Provinces in Ceylon, being in the ratio of 4·0 per 1,000; in 1815 and 1817 they had no deaths from this disease.† In 1816 the advancing edge of the wave would pass over the zone beyond the isoclinal 30° N., but there is no information available with regard to it here. In 1817 it would overspread the zone beyond the isoclinal 53° N., the posterior margin at the end of that year having reached the isoclinal 30° N. only, involving the Mediterranean stations, and towards the end of the year, Bermuda, while that portion of Bengal north of lat. 24° was still under its influence. In the Ionian Islands the ratio was less than in 1816, but there was a mortality of 1·0 per 1,000 of strength from it, indicating a more severe form of disease. There were cases at almost all the stations, though at Zante there were only 8, in place of 25 the previous year. At Malta the ratio was 2·4 only in 1817, but in 1818 it was almost doubled. Bermuda, which had a ratio of 9·1 in 1817, declined to 8·1 in 1818.

Such were the circumstances preceding and accompanying the great outbreak of cholera along the Ganges in the summer of 1817. They afford unquestionable evidence that the causes of the disease were gradually acquiring force, and that their influence was experienced from the Cape to the British Islands, and from Ceylon to Canada. What led to its appearance in India in the epidemic form, it may be difficult to say; but the immediate exciting cause was not only not confined to that country, but had existed elsewhere previously in the greatest intensity, as the occurrences on board the "Mangles" prove.

The district of Jessore is usually named as the place where the epidemic first manifested itself, though it was found at a very early period that the disease had occurred at others far removed from it, previously to breaking out there in force. A soldier of Her Majesty's 59th Regiment was attacked with cholera at Calcutta on 30th March, 1817, and died in 36 hours; and as early as May the disease occurred at Nuddea and Kishnagur, about 60 miles north of Calcutta. In June it was at Mymensing, and in several villages along the

* Transactions of College of Physicians, Ireland, vol. ii, p. 510.
† Marshall, Medical Topography of Ceylon, p. 91, 2.

Brahmapootra; in July it was at Patna, on the Ganges, 300 miles in a direct line north-west of Calcutta, and 350 west of Mymensing; in August it was pretty general throughout the Delta of the Ganges, and embracing Chittagong, Dacca, and Sylhet to the eastward.* So that the Delta and Valley of the Ganges, as far as Patna, was under the influence of the common cause previous to the disease assuming the proportions of an epidemic in the Jessore district about the middle of August. In September, Balasore was included in the epidemic circle, the furthest point it reached to the south this year; and towards the end of the month it embraced Ghazeepore and Mozufferpore, near Benares. During October the disease does not seem to have extended its sphere of action; but early in November, coincident with its usual increase at that season in Lower Bengal, it commenced at Mirzapore on the Ganges, Rewah some distance to the south, and extended into Bundlecund. On the 8th November it broke out with great violence in the centre division of the Grand Army under the Marquis of Hastings, encamped on the bank of the Sinde. In all this course the disease had shown itself in the low alluvial tract along the Ganges and its affluents, and had nowhere ascended the higher ground bounding the valleys on either side. It was thus confined to the malarious localities in the vicinity of the rivers, which subsequent experience has proved are particularly subject to it. It occurred in the year following a very general and severe epidemic of fever along the course of the Ganges, and at a time when not only cholera was unusually frequent elsewhere, but coincident with a general aggravation of the causes of fever in other parts of the world.

The disease became general among the natives at Calcutta in August, and among the Europeans in September.† It decreased greatly in November and December, and nearly disappeared in January 1818. About the 20th February the temperature rose 10°, and the hot season at Calcutta may be said to have commenced. This was accompanied by an immediate increase of cholera, which attacked Europeans and natives indiscriminately, and continued until the end of July.‡ The increase in February occurred with the following wave, under which the causes of the disease became efficient over a much larger area, and it was no longer confined to the Valley of the Ganges, as in 1817.

This wave would have started from the isoclinal 53° S. on 1st January, 1815. There are no facts regarding it available at the Cape or Mauritius that year. As mentioned above, there were two deaths in the interior of Ceylon from cholera in 1816, out of the small force employed there; but as the dates are not available, it is impossible to say whether they were attributable to this wave, the advancing edge of which would pass over the island between 1st October and 31st December, or the preceding one, which would retire as this approached. The wave, in accordance with the usual course, would reach the isoclinal 30° N. by 1st January, 1818. Calcutta is a little to the south of this line; and its influence there, on the accession of the warm weather, has been already noticed. The epidemic appeared at points to the north of the isoclinal 30°, after the wave embraced them: thus cholera commenced at Banda, Allahabad, and Sylhet in March; in April it attacked Gorrukpore, Oude, Fyzabad, and Lucknow; in May it commenced at Goorgaun, near Delhi; in June it was at Katmandoo, and in the Nepaul district; in July it was at Saharunpore. During this period the epidemic appeared at many places south of those mentioned, under the full action of the wave, which it is unnecessary to particularise, the object here being to show its gradual and regular advance.

The epidemic of 1818 presents a striking contrast to that of 1817, as it not only spread over the country to the base of the Himalayas, but passed through these, affecting the elevated district of Nepaul, and scarcely a month later than the low country, which came under its influence about the same time. This difference must be attributed to a much greater intensity of the cause of the disease under the new wave. As is well known, cholera spread to the south from the isoclinal 30°, and in the course of 1818 brought the whole of the peninsula under its influence. Some of the features it displayed in its progress may be noticed here with advantage.

In March 1818 cholera appeared at Ganjam, on the east coast, about the same time as it had done there among the troops under Colonel Pearse in 1781,

* Corbyn, p. 5. † Ibid., p. 60. ‡ Ibid., p. 62–3.

and among those under Colonel Cockerel in 1790. In April, though extending with severity to the northward in the Valley of the Ganges, it does not seem to have manifested itself in the higher ground to the south; but in May it appeared there also, and in the course of that month attacked Saugor, Bilsah, Bhopal, Oogein, Hussingbad, Mottaye, and Nagpore in Central India, and, on the east coast, extended to Vizagapatam. In June there seems to have been another lull in the progress of the disease to the southward, but in July it was again found invading fresh territory, and was experienced at Malligaum, Jaulnah, Ahmednuggur, Poonah, Punderpore to the westward; at Hydrabad in the Deccan; and at Rajamundry, Ellore, Masulipatam, Guntoor, and Cuddapah* on the low ground on the east coast. In August the disease appeared at Surat and Bombay, on the seashore on the west coast; and at Sattara, Badamy, Darwar, and Hoobly, places on the tableland to the eastward of, but close to the ridge of mountains which runs down the western side of Hindostan. So far the progress of the disease to the southward, along the low ground on the east coast, preceded that along the higher ground in the interior, so that it appeared to move from north-east to south-west, and it did not cross the mountains to the low ground on the west coast until it had approached their crest on the east, at a point much farther to the south. In September, Soonda, Bellary, Hurrighur, and Chittledroog were affected; and in October, Madras, Poonamallee, Arcot, and Nagore to the eastward; also Bangalore in the interior, and Calicut, Quilon, and Aleppee on the west coast; and in November, Salem, Trichinopoly, and Madura. The course of the disease in these instances was no doubt determined, in a great measure, by the prevalence of the hot weather preceding or coincident with the commencement of the south-west monsoon over the interior of the country and along the east coast. In August and September, when the force of the south-west monsoon was broken at Surat and Bombay, and at Darwar immediately beyond the Western Ghauts, it manifested itself in these and the neighbouring country. In October, with the diminution and disappearance of the south-west monsoon, Madras, Bangalore, and the remainder of the Malabar Coast, became affected with the disease; and in the following month it embraced the south-east portion of this district. Subsequent epidemics show the usual period for the appearance of cholera, between the isoclinals 0° and 30° N., corresponds with the first hot season after the arrival of the wave at each place, as elsewhere. As 1818 seemed an exception, it has been deemed advisable to notice it at some length. Why the disease did not break out in the hot season of 1818 in each locality, from Cape Comorin northwards, in which it subsequently showed itself, it is not easy to say, but that its causes were even then in action is apparent from the fact, that at Calicut there were two cases as early as May † of that year, and at Trevandrum frequent slight cases in May, and again in August,‡ though it did not become epidemic at those places until October and November. In 1819, the second year of this wave in India, cholera continued to cause much mortality.

The statistical returns of the health of the troops, at the various stations occupied by the British Army, commence with 1817. The admissions and deaths from all forms of cholera, taken from these, and reduced into millesimal ratios of the strength, are given in Table I. These returns come up to 1836 only for Mauritius, Cape Town, Ceylon, West Indies, and Jamaica; those for the Mediterranean, American, and Home stations, are for ten years longer, and embrace 1846. The ratios for Mauritius and Ceylon, from 1837 to 1858-9, have been added from data kindly sent me by Deputy Inspectors-General Gordon and Dane, from the records at these stations. Those for the Cape, which include the troops on the frontier and at Natal, from 1837, are from data in the Principal Medical Officer's office on that station. The ratios for India are derived from Tables of the diseases and mortality in the Indian Annals of Medicine, and for England from the Registrar-General's Reports. Previous to 1836, the returns for the British troops were made up to the 20th December

* Cuddapah, though nearly 70 miles from the sea, is about 500 feet only above its level. Hyderabad is about 1,800.

† Corbyn, p. 21.

‡ "Edinburgh Medical and Surgical Journal," new series, vol. iv, p. 180, from Scott's Report.

each year; from that date up to 1859, the year closed on 31st March. The returns for Bombay seem to be made up to the day last-mentioned, those for Madras close with the year, and for Bengal at the same period, up to 1845, subsequent to which they end apparently on 31st March. From 1859 the ratios are taken from the Sanitary Reports of the Army, the returns for which close on 31st December each year. The smaller Table II is added to embrace some stations not mentioned in Table I.

TABLE I.

MILLESIMAL Ratio of Admissions and Deaths from Cholera (Common and Epidemic) at undermentioned Stations each year.

Year.	Mauritius.		Cape Frontier.		Cape Town.		Ceylon.		Madras.
	White Troops.		White Troops.		White Troops.		White Troops.		White Troops.
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Died.
1817.. ..	..	..	..	..	..	..	4·0	..	..
1818.. ..	6·2	·8	..	..	·8	..	3·5	·7	..
1819.. ..	102·8	16·6	..	..	1·7	..	93·4	35·1	..
1820.. ..	131·8	9·8	..	..	4·1	..	24·8	4·8	..
1821.. ..	3·1	..	..	..	1·3	·6	9·6	1·2	..
1822.. ..	3·0	..	..	..	1·4	..	21·3	·9	..
1823.. ..	4·0	·8	..	..	1·5	..	7·0	·5	..
1824.. ..	4·2	..	2·1	2·1	3·8	..	14·4	·6	..
1825.. ..	4·5	..	..	..	1·5	..	91·2	21·4	..
1826.. ..	17·2	..	..	..	·8	..	6·5	·5	..
1827.. ..	10·6	..	5·4	..	..	..	7·6	..	..
1828.. ..	6·7	..	..	..	1·7	..	13·5	·5	..
1829.. ..	35·2	..	1·7	..	·9	..	31·1	6·1	3·0
1830.. ..	6·2	..	..	..	1·7	..	6·9	..	3·9
1831.. ..	4·5	..	5·0	..	2·6	·9	18·8	·9	8·4
1832.. ..	..	..	..	..	·9	..	199·4	52·0	21·1
1833.. ..	·4	..	..	..	..	..	11·0	..	23·7
1834.. ..	1·8	..	..	..	3·7	..	2·9	·5	1·5
1835.. ..	..	..	..	..	56·3	..	2·0	..	·2
1836.. ..	1·3	1·3	..	..	..	..	3·8	·5	·3
1837-38 ..	3·1	..	..	..	·4	..	3·6	·5	7·2
1838-39 ..	2·5	1·3	..	..	3·0	..	5·2	·5	5·3
1839-40 ..	1·9	1·3	..	..	1·0	..	4·7	..	..
1840-41 ..	1·5	..	..	..	..	..	41·1	18·4	..
1841-42 ..	4·1	2·0	..	..	..	..	·8	·8	..
1842-43 ..	1·0	..	..	..	·4	..	2·2	..	13·5
1843-44 ..	1·1	..	..	..	·7	..	11·9	5·9	16·6
1844-45 ..	2·8	·6	..	..	1·1	..	10·7	..	4·1
1845-46 ..	·6	..	..	..	..	..	19·3	10·0	9·9
1846-47 ..	1·1	..	..	..	·2	..	122·2	69·9	6·7
1847-48 ..	1·1	..	..	..	·2	..	59·5	18·9	1·9
1848-49 ..	1·0	..	..	..	·5	..	4·2	1·2	·2
1849-50 ..	..	..	..	..	·5	..	2·3	·6	2·7
1850-51 ..	·5	..	..	..	·2	..	1·2	..	2·3
1851-52 ..	..	..	..	..	..	..	·6	..	1·6
1852-53 ..	..	..	..	..	·2	..	2·4	·6	..
1853-54 ..	9·5	..	..	..	..	..	13·8	7·8	..
1854-55 ..	34·4	20·2	..	..	..	..	8·1	2·0	..
1855-56 ..	23·5	15·1	..	..	·2	·2	..	..	..
1856-57 ..	21·8	11·7	..	..	..	..	..	..	..
1857-58 ..	1·4	..	..	..	·1	..	1·2	..	..
1858-59 ..	..	..	..	..	..	..	12·0	7·2	..
1859.. ..	·8	..	..	..	·7	..	6·6	1·1	..
1860.. ..	2·7	·5	..	..	..	..	3·3	2·2	3·5
1861.. ..	3·1	2·1	..	..	..	..	9·9	3·3	2·7
1862.. ..	82·5	31·2	..	..	..	..	2·3	..	3·7
1863.. ..	..	..	..	..	..	..	4·5	2·2	3·7

TABLE I, &c.—*continued.*

Year.	Bombay.			Bengal.			West Indies.		Jamaica.	
	White Troops.	Black Troops.	Prisoners.	White Troops.	Black Troops.	Prisoners.	White Troops.		White Troops.	
	Died.	Died.	Died.	Died.	Died.	Died.	Admitted.	Died.	Admitted.	Died.
1817 ..	..	·2	..	..	..	..	3·5	..	6·1	..
1818 ..	8·4	5·8	..	3·0	..	..	15·7	·2	8·1	..
1819 ..	5·5	9·9	..	5·8	..	..	18·7	·8	10·3	..
1820 ..	8 3	11·9	..	5·9	..	..	16·3	..	10·6	..
1821 ..	15·1	5·1	..	7·9	..	..	21·0	·5	4·6	..
1822 ..	3·7	1·0	..	6·4	..	..	25·2	·9	1·9	..
1823 ..	·8	·1	..	6·7	..	..	19·3	..	3·5	..
1824 ..	2·2	5·0	..	6·9	..	..	17·6	·2	4·9	..
1825 ..	19·9	8·5	..	6·7	..	..	9·0	·2	2·0	..
1826 ..	15·7	2·7	..	21·1	1·5	..	21·0	·2	·5	·5
1827 ..	5·2	1·1	..	15·8	1·9	..	9·8	·7	16·5	·4
1828 ..	14·7	·8	..	16·4	1·5	..	2·9	·2	·4	..
1829 ..	·4	·5	..	10·2	1·0	..	7·2	·2	·4	..
1830 ..	2·7	3·5	..	6·9	9	..	5·4	..	·3	..
1831 ..	2·6	1·4	1·9	6·7	·9	..	10·9	..	·5	..
1832 ..	7·1	1·7	8·1	3·0	·8	..	25·9	..	1·0	..
1833 ..	7·3	1·9	15·5	11·8	·7	7·7	18·7	·2	6·9	·4
1834 ..	1·1	3·5	5·4	6 9	2·0	6·3	10·5	·2	1·3	..
1835 ..	·8	·9	1·6	4·2	1·5	7·0	6·6	·7	1·0	..
1836 ..	·4	·1	9·4	4·1	2·6	8·5	12·1	..	4·8	..
1837–38	4·3	7·2	9·3	9·5	4·3	5·9	..	..	..	..
1838–39	5·5	4·3	12·8	13·9	3·6	11·5	..	..	..	..
1839–40	15·2	4·8	20·6	2·9	1·8	10·1	..	..	..	..
1840–41	6·4	3·4	11·2	8·1	2·2	8·4	..	..	..	..
1841–42	4·0	1·0	3 9	9·0	2·7	8·9	..	..	..	..
1842–43	55·5	5·9	31·1	23·9	3·0	9·6	..	..	..	..
1843–44	7·2	3·0	10·1	10·7	2·0	10·2	..	..	..	..
1844–45	8·5	2·1	16·3	7·1	1·9	10 3	..	..	..	..
1845–46	9·7	5·2	30·4	46·2	2·0	18·5	..	..	..	..
1846–47	51·9	1·1	29·7	4·2	1·5	5·5	..	..	..	..
1847–48	·1	·7	..	4·3	1·2	6·8	..	..	..	..
1848–49	·1	·1	·1	6·5	1·2	4·9	..	..	..	..
1849–50	8·4	1·9	8·2	11·9	·7	9·4	..	..	..	..
1850–51	5·6	2 3	10·1	·4	1·5	5·2	..	..	..	..
1851–52	5·6	1·7	12·8	3·0	·4	7·1	..	..	..	..
1852–53	·1	·3	·8	12·5	2 4	10 4	..	..	..	..
1853–54	2·7	2·3	3·5	12·0	..	11·0	..	..	..	..
1854–55	..	..	..	..	..	..	..	..	..	..
1855–56	..	..	..	..	..	..	..	..	..	..
1856–57	..	..	..	..	..	..	..	..	..	..
1857–58	..	..	..	..	..	..	..	..	..	..
1858–59	..	..	..	..	..	..	..	..	..	..
1859 ..	..	..	..	..	..	..	..	..	..	..
1860 ..	9 2	..	..	12·5	..	..	..	..	..	..
1861 ..	4·0	..	..	23·5	..	..	·8	..	..	..
1862 ..	4·6	..	..	8·3	..	..	..	..	..	1·2 (Black)
1863 ..	·6	..	..	3·7	..	..	1·7	..	..	..

TABLE I, &c.—*continued.*

Year.	Ionian Islands.		Malta.		Gibraltar.		Bermuda.		Nova Scotia.	
	White Troops.		White Troops.		White Troops.		White Troops.		White Troops.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
1817 ..	4·3	1·0	2·4	..	..	..	9·1	..	6·7	..
1818 ..	6·6	..	4·3	..	2·9	..	8·1	..	..	..
1819 ..	5·0	·3	4·0	..	6·0	·3	4·8	..	4·1	..
1820 ..	11·9	·4	14·7	·6	14·6	·3	3·0	..	2·4	..
1821 ..	12·1	·6	11·4	..	29·9	..	14·3	..	2·8	..
1822 ..	15·1	..	11·0	·5	24·1	..	9·2	..	3·2	·5
1823 ..	19·6	·5	4·1	..	15·0	..	..	..	23·9	·5
1824 ..	30·3	..	14·0	·5	33·7	·6	28·3	4.7	6·6	..
1825 ..	34·2	·6	9·7	..	36·8	..	7·5	..	19·0	..
1826 ..	28·2	·6	2·4	..	29·4	..	..	..	32 6	·5
1827 ..	22·9	..	6·4	..	11·2	..	..	..	10·7	..
1828 ..	23·2	..	4 2	..	39·5	·3	45·6	..	3·1	..
1829 ..	26·2	..	10·5	..	23·0	..	29·1	..	11·2	..
1830 ..	33·6	..	15·7	..	14·3	..	..	..	7·5	·4
1831 ..	18·9	..	21·4	1·0	23·6	..	161·6	..	18·9	..
1832 ..	10·8	..	17·1	..	16·4	..	50·6	1·7	1·2	..
1833 ..	12·9	..	9·9	..	6·9	..	30·9	..	1·0	..
1834 ..	13·1	..	35 0	..	187·9	43·2	39·2	..	106·8	30·0
1835 ..	11·9	..	8·5	..	15·0	..	1·5	..	5·8	..
1836 ..	8·8	..	15·1	..	4·5	·3	6·2	..	·9	..
1837–38	6·2	..	96·8	21·8	18·5	..	11·2	..	4·8	..
1838–39	3·1	..	6 9	..	12·2	..	12·7	..	3·7	..
1839–40	7·5	..	9·9	..	11·7	..	..	..	8·7	..
1840–41	9·5	·8	3·0	..	10·1	·3	2·7	..	4·3	..
1841–42	1·4	..	1·9	..	4·7	..	2·7	..	2·9	..
1842–43	3·2	..	..	..	2·5	..	1·4	..	·3	..
1843–44	3·0	..	..	..	·6	..	4·6	..	3·4	..
1844–45	7·2	..	..	..	1·5	..	2·2	·7	4·3	..
1845–46	4·7	..	2·7	..	2·1	..	..	..	2·8	..
1846–47	41·3	·4	·5	..	·6	..	3·1	..	11·8	·4
1847–48	..	..	..	..	..	..	..	..	..	..
1848–49	..	..	..	..	..	..	..	..	..	..
1849–50	..	..	..	..	..	..	..	..	..	..
1850–51	..	..	..	..	..	..	..	..	..	..
1851–52	..	..	..	..	..	..	..	..	..	..
1852–53	..	..	..	..	..	..	..	..	..	..
1853–54	..	..	..	..	..	..	..	..	..	..
1854–55	..	..	..	..	..	..	..	..	..	..
1855–56	..	..	..	..	..	..	..	..	..	..
1856–57	..	..	..	..	..	..	..	..	..	..
1857–58	..	..	..	..	..	..	..	..	..	..
1858–59	..	..	..	..	..	..	..	..	..	..
1859 ..	·8	..	..	..	·2	..	..	..	..	..
1860 ..	..	..	·3	·2	8·9	5·5	..	..	1·1	..
1861 ..	..	..	·2	..	..	..	..	..	·6	..
1862 ..	..	..	·2	..	..	..	..	..	·3	..
1863 ..	·2	..	..	..	..	..	..	..	..	..

TABLE I, &c.—*continued.*

Year.	Canada.		Home Station.							
	White Troops.		Dragoon Guards and Dragoons.		Foot Guards.		Infantry.		England.	London.
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Deaths.	Number of Deaths.
1817 ..	·4	..	..	..	..	..	..	..	..	..
1818 ..	..	..	..	..	..	..	..	..	..	..
1819 ..	1·4	..	..	..	..	..	..	..	..	..
1820 ..	·3	..	..	..	..	..	..	..	..	..
1821 ..	·9	..	..	..	..	..	..	..	..	..
1822 ..	·9	..	..	..	..	..	..	..	..	..
1823 ..	1·3	..	..	..	..	..	..	..	..	..
1824 ..	2·2	..	..	..	..	..	..	..	..	..
1825 ..	3·3	..	..	..	..	..	..	..	..	..
1826 ..	15·4	·4	..	..	..	..	..	..	..	..
1827 ..	13·7	·3	..	..	..	..	..	..	..	..
1828 ..	6·1	..	..	..	..	..	..	..	..	..
1829 ..	15 2	·7	..	..	..	..	..	..	..	..
1830 ..	19 1	..	3·0	..	..	..	..	..	..	..
1831 ..	10·9	·3	5·8	..	..	..	..	..	..	..
1832 ..	124·5	34·0	39·8	4·5	..	4·0	..	4·0	..	..
1833 ..	4 9	·4	8·3	2·4	..	2·6	..	1·9	..	..
1834 ..	53·7	13·4	6·1	1·8	..	1·4	..	1·2	..	..
1835 ..	5·4	..	4·2	..	..	..	..	..	..	..
1836 ..	2·3	..	1·7	·3	..	·2	..	..	..	..
1837–38	2·8	..	3·6	..	4·7	..	1·6	·2	..	..
1838–39	2·9	·1	3·0	..	2·6	..	1·4	..	·02	..
1839–40	1·4	..	1·3	..	2·1	..	1·0	..	·03	..
1840–41	1·7	·2	1·1	..	2·0	..	1·9	·1	·05	66
1841–42	4·4	·2	·6	..	1·6	..	·5	..	·03	28
1842–43	3·1	·1	2·2	..	11·2	..	2 2	..	·10	126
1843–44	1·1	..	1·5	·2	·6	·2	1·3	·1	..	88
1844–45	2·9	..	2·6	..	1·8	..	·8	·1	..	65
1845–46	2·6	·1	·7	..	1·0	..	·8	·04	..	43
1846–47	13·4	·3	2·6	..	2·2	..	1·4	·1	..	228
1847–48	..	..	..	..	..	..	..	..	·05	117
1848–49	..	..	..	..	..	..	..	..	·11	647
1849–50	..	..	..	..	..	..	..	..	3·04	14,125
1850–51	..	..	..	..	..	..	..	..	·05	127
1851–52	..	..	..	..	..	..	..	..	·06	213
1852–53	..	..	..	..	..	..	..	..	·08	162
1853–54	..	..	..	..	..	..	..	..	·24	881
1854–55	..	..	..	..	..	..	..	..	1·09	10,708
1855–56	..	..	..	..	..	..	..	..	·05	149
1856–57	..	..	..	..	..	..	..	..	·04	152
1857–58	..	..	..	..	..	..	..	..	·06	195
1858–59	..	..	..	..	..	..	..	..	·04	131
1859 ..	1·4	..	·4	·1	..	..	..	..	·05	193
1860 ..	..	..	..	..	..	..	..	..	·02	51
1861 ..	·6	..	·1	..	..	..	·1	..	..	..
1862 ..	·4	..	·1	..	..	..	·1	..	..	..
1863 ..	·6	..	..	..	..	..	..	..	..	..

TABLE II.

MILLESIMAL Ratios of Admissions and Deaths from Common and Epidemic Cholera, &c.

Year.	New Zealand.		St. Helena.		Ceylon.		Gambia.		South China.				Shanghai.				North China.				Bahamas.	
	White Troops.		White Troops.		Black Troops.		Black Troops.		White Troops.		Black Troops.		White Troops.		Black Troops.		White Troops.		Black Troops.		Black Troops.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
1859.. ..	..	..	..	..	1·3	1·3	..	..	1·3	1·3	1·0	..	..	..	..	..	..	..	..	..	..	..
1860.. ..	..	..	..	..	6·5	3·9	..	..	7·8	7·0	·4	..	..	..	..	..	13·0	5·2	17·2	6·6	..	..
1861.. ..	..	..	1·5	..	·7	..	2·3	2·3	·3	..	2·1	·4	..	..	..	..	3·2	2·2	4·2	..	..	..
1862.. ..	·4	..	..	..	8·2	6·8	..	..	·9	..	..	..	103·5	58·0	37·7	14·1	42·3	41·2	..	..	..	..
1863.. ..	·7	..	1·6	1·6	·7	·7	..	..	8·3	6·6	See	next	42·8	25·4	35·9*	6·4*	..	..	..	..	2·4	..

* These ratios for all China; part of the Blacks were at Hong Kong, and part at Shanghai, and the returns do not give them separately. The greatest mortality was at the latter.

If the progress of cholera in 1818, in other countries between the isoclinals 0° and 53° N., be examined, it is found that it was epidemic in the Burmese Empire, Arracan, and, it is said, Malacca. In the West India Command, while the attacks from cholera in 1817 were 3·5 per 1,000 only, in 1818 they rose to 15·7, and in Jamaica from 6·1 in the former year to 8·1 in the latter. At St. Helena the admissions among the troops, in 1818, were 13·7 per 1,000 of strength, with a mortality of 0·9, no case having occurred the previous or following year; from want of information as to the date of these attacks, it is impossible to decide whether they should be placed under this wave or the following one, they show, however, that this island was then within the sphere of action of the causes of the disease. There is no return from Sierra Leone in 1818; but in 1819, out of the small force amounting to 35 Europeans, there were 3 attacks, or in the millesimal ratio of 86·0, though this was the second year of the wave there. In 1819 the advancing edge of the wave would proceed from the isoclinal 53° N. to 70°; that year the ratio of admissions at Gibraltar was doubled, though in Malta and the Ionian Islands it was rather less; but in 1820, at all, the ratios were greatly increased. Bermuda, which is in this zone, is so far north that the wave can reach it in October only, too late in the season for the occurrence of cholera to any extent, and consequently its outbreaks must be expected in the year corresponding to the zone beyond the isoclinal 70° N. In 1820 the ratio of admission was 3·0 only; but in 1821, the second year of the wave, it rose to 14·3, corresponding, in this particular, with Sierra Leone and the Mediterranean stations. In Nova Scotia and Canada, in 1820, the ratios of admissions fell considerably from the previous year; but in 1821 there was a slight increase, indicating a minor degree of the same influence experienced at Bermuda.

The next wave would start from the isoclinal 53° S., on 1st January, 1817; but for that year there is no information either for the Cape or Mauritius. Whether the occurrences at St. Helena, in 1818, are to be considered as belonging to it, is doubtful, as already stated. This wave would reach the isoclinal 0° on 1st January, 1819; and here a series of circumstances present themselves which require a detailed examination.

The isoclinal 0° passes through the southern part of Hindostan, a little to the south of Cochin and Madura, and cuts the northern extremity of Ceylon in about lat. 9° 25′ N. Cholera had gradually extended to the south in India, in 1818, until it reached this line in October and November; towards the middle of December it seems to have ceased, or assumed a sporadic character, at every point in its neighbourhood; but soon after the commencement of 1819 the disease displayed itself with increased vigour. At Jafna in Ceylon, which is north of the isoclinal 0°, there were a few cases about the middle of December 1818; but no others anywhere else in the island for about a month. At Manaar, which is to the south of the isoclinal, the disease commenced in the middle of January 1819; and towards the end of the month it had affected Colombo, Kandy, and other stations in the interior. It was at Trincomalee in April.

While these outbreaks were developing themselves in Ceylon, others were in progress in the southern part of the neighbouring continent, which also require notice. The disease had almost disappeared from the country in December, except in a narrow tract running across it from about Calicut, on the Malabar coast, to Nagore on the Coromandel. It had affected Calicut, Aleppee, and Quilon, on the coast, in October, and had diminished at each in the end of November. At Calicut the disease became more frequent again in December, and did not decline before February 1819. This increase was experienced at Cochin to the south, where cholera commenced on 8th December, and disappeared early in January. At Tellichery, to the north, there was an outbreak, commencing on 25th November, which disappeared early in January; and at Cannanore a similar one, confined to December, but followed by other cases on 10th February, 1819. In the district of Coimbatore, to the east of the Western Ghauts, the disease was prevalent from the end of November to the end of January. At Trichinopoly it prevailed from the end of October to the end of November, and again in the middle of January for a few days. At Tanjore it commenced on 20th November; during December it was irregular in its appearance, in January 1819 it was at its height, and declined immediately after. At Combaconum, a little to the north of Tanjore, it prevailed from

20th November to end of December, and for a few days again in the middle of January 1819. At Nagore, on the coast, the disease was experienced from 10th November to 20th December, and again in the middle of January for a few days. The position of the isoclinal 0°, in this vicinity, may be given as lat. 10° in long. 75°, and lat. 9° 36′ in long. 80°, and it crosses the southern extremity of the peninsula obliquely, a little to the south of Cochin and Madura; so that the wave, on the assumption that it is at 0° on the 1st January, should reach those places on the 6th of that month, Tanjore about the end, and Calicut about the 12th February. This increase of the disease, then, in December and January, which extended right across the country from sea to sea, seems to have been in connection with the previous sickness to the northward, and to have approached the limit of the advancing wave of 1819; but inasmuch as the disease did not continue at any of these places, but receded to the northward as the wave advanced, while it prevailed in a severe form at many points to the southward within its influence, the position here assumed for it on 1st January cannot be materially in error.

In its progress northward the wave would reach Wallajabad, to the southwest of Madras, in the latter days of March, and Madras itself early in April. Cases of the disease occurred at the former in April, and early in May they were common at both, as well as at Arcot, Vellore, Chittore, and Poonamallee, and the epidemic reached its height in the hot season, and became very prevalent over the country to the south at the same time. There were cases in the northern part of the Zillah of Nellore, about the middle of April, and at Ongole, 30 miles south of that district, on 16th May; at Nellore on 3rd July. The epidemic at Ongole continued to the end of August, and at Nellore to the end of September. Ongole, according to the principles advocated above, would come under the operation of the advancing wave in the first days of June; Nellore about the 10th May. The continuance of the epidemic at these places to August and September is due to the influence of the wave of 1819, and though, under that then receding from its neighbourhood, cases appeared at Ongole earlier than the advancing wave could have reached that place; the force of the epidemic occurred later, and there is nothing different in this from what was shown to have taken place at Peshawur in the 93rd Highlanders, and elsewhere, or incompatible with the principles endeavoured to be established by this investigation.

While cholera was pursuing this course in India and Ceylon, it appeared in Sumatra, and attacked Singapore, Penang, and the Kingdom of Siam, which, in respect to this wave in 1819, was similarly situated as Southern India.

In 1820 this wave would pass the isoclinal 30° N. on 1st January, and overspread the northern part of India and the neighbouring countries. This year the ratios of mortality among the white and coloured troops in the Bombay Presidency rose considerably above those for 1819; and in the Bengal army, among the Europeans, the mortality was as high as in 1819. At Canton the disease broke out in April this year, and cases were common at Ningpo as early as May.* It was likewise epidemic in Tonquin, and through Cochin China and Cambodia, and in the Phillipine Islands. It also passed the Indus, and appeared in Beloochistan. In the basin of the Atlantic the indications of the operation of the same influence were very manifest; there were no attacks among the troops at Sierra Leone this year, but the number under observation was much smaller than in 1819; the admissions among those in the West Indies, however, were almost as numerous as the previous year, and in Jamaica rather more so. In 1821 the wave would advance from the isoclinal 53° N.; the ratio of admissions in the Ionian Islands continued as high as in 1820, that at Malta was somewhat lower, but at Gibraltar it rose to 29·9 from 14·6 in 1820. In 1821 the causes of the disease seem to have been very active in Northern India, though the second year of the wave there, and the mortality among the white troops, of both Bengal and Bombay armies, was considerably higher than in 1820, though that among the natives, in the latter, was lower. The admissions in the West Indies showed a considerable increase also, while at Jamaica they were reduced. Accompanying these manifestations among the

* Milne in "Edinburgh Medical and Surgical Journal," No. 159, p. 483, *et seq.* (April, 1844.)

troops, cholera became epidemic in 1821 along the shores of the Persian Gulf, and proceeded as far north as Yezd and Bagdad. In 1822 the wave would start from the isoclinal 70° N.; the ratio of attacks at Bermuda, which was high the previous year, diminished about a third, but was still considerable; at Nova Scotia there was a slight increase, passing into a very high ratio in 1823, while in Canada there was little alteration. In 1822 in the Mediterranean, under the second year of the wave, the Ionian Islands showed a considerably greater number of attacks, while at Malta and Gibraltar they were nearly as numerous as in 1821. In 1822 also the disease, in its epidemic form, which had stopped the previous year at Yezd in Persia, and at Bagdad on the Tigris, extended as far north as Tabriz and Diarbekir in lat. 38°, and approached the Mediterranean as far as Aintab and Aleppo.

The next wave, in succession to that just traced, would be at the isoclinal 53° S. on 1st January, 1819. Accordingly, while the ratio of admissions among the troops at Cape Town in 1818 was 0·8 only, this year it was 1·7, and in 1820 it rose to 4·1. At Mauritius the ratio, which in 1818 was 4·5, not only rose in 1819, but towards the end of November the disease commenced in the epidemic form, and, in January following, in the neighbouring island, Bourbon. In 1820 when the wave would overspread the zone between the isoclinals 30° S. and 0°, there was a ratio of attacks of 1·5 among the troops at St. Helena with a mortality of 0·8; in 1821 the attacks rose to 10·9 per 1,000, and the deaths to 1·2. This wave would reach the isoclinal 0° by the beginning of 1821; there were some cases and deaths in Ceylon that year, and a considerable mortality in Southern India, though much less than the previous year. During this year, too, under the second year of the wave, cholera broke out in Java, Borneo, and intermediate places. In 1822 the wave would proceed from the isoclinal 30° N.; the mortality among both the European and native troops at Bombay was much reduced, and there was also a considerable fall in the ratio for the Bengal troops. Cholera was more frequent in the West Indies than in 1821, and led to a mortality of 0·9 per 1,000; in Jamaica the ratio was reduced, and indeed very low. At the beginning of 1823 this wave would leave the isoclinal 53° N., and the ratio of attacks among the troops in the Ionian Islands was again considerably higher than the previous year, with a mortality of 0·5. At Malta the ratio among the troops was less than in 1822, among the civil population 0·03 per 1,000 died of cholera. At Gibraltar the admissions were fewer than in 1822. At all these stations there was a very great increase in the number of attacks in 1824, with a mortality of 0·6 per 1,000 at Gibraltar, and 0·5 at Malta. In 1823 cholera prevailed epidemically over the north of Persia, in Syria, and extended as far north as Astrachan and Orenburg. In 1824 the wave would overspread the zone to the north of the isoclinal 70° N.; the attacks at Bermuda this year were 28·3 per 1,000, and the mortality 4·7; the ratios were low in Nova Scotia and Canada in 1824. There is little information within my reach regarding England this year, but the following is given, in the numbers of the "Edinburgh Medical and Surgical Journal," from January 1824 to January 1825, in a statement of various diseases met with in Birmingham, for the quarters ending

	Cholera.
1823, October 3rd	4
,, January 3rd	3
1824, April 3rd	..
,, July 3rd	3
,, October 3rd	53

showing a much greater prevalence in the latter than in the former year.

The next wave to occupy attention is that which would leave the isoclinal 53° S. on 1st January, 1821. Neither at the Cape nor Mauritius was cholera frequent this or the following year. The wave would be at the isoclinal 0° at the beginning of 1823, during which there was very little of the disease in Ceylon. In 1824, when it would pass into the next zone, the mortality among the European troops in the Bombay Presidency was low, though greater than the previous year, that among the natives was considerable; both were largely increased in 1825. The ratio among the white troops in Bengal remained both years, with little alteration from the previous one. The disease does not seem

to have been very active in the countries on either side of India this year. In the West Indies the attacks were rather fewer than the previous year; in Jamaica they were a little more frequent; both declined considerably the following year. The wave would enter the zone beyond the isoclinal 53° N. in 1825; this year both in the Ionian Islands and Gibraltar, the disease was more common even than in 1824, at Malta it was less so; in the Ionian Islands there was a mortality of 0·6. In 1826 the wave would be experienced in the next zone. There were no admissions at Bermuda, but in both Nova Scotia and Canada, they were much more frequent than any previous year in the returns, and there was a mortality of 0·5 at the former, and of 0·4 at the latter.

In the beginning of 1823 another wave would start from the isoclinal 53° S.; there is a slightly higher ratio of attacks for Mauritius this year, which is maintained the following one. At Cape Town, in 1823, the ratio is almost identical with that for 1822, but in 1824, both there and on the frontier there is an increase. This wave would reach the isoclinal 0° on 1st January, 1825. In Ceylon there were cases at Trincomalee in November and December 1824, and early in January following there was a sharp epidemic at Colombo. I have no evidence regarding the southern part of India this year. In 1826, when the wave would proceed beyond the isoclinal 30° N., and affect northern India, a very high rate of mortality contained among the white troops in the Bombay Presidency, and that among those in Bengal rose from 6·7 per 1,000 in 1825 to 21·1. Cholera is said to have prevailed in China this year in a severe form.* In the West Indies the admissions among the troops rose from 9·0 the previous year to 24·0, though with a mortality of 0·2 only, while in Jamaica the only person attacked, died; in the following, the second year of the wave, the attacks in the West Indies fell to 9·8, but with a mortality of 0·7, while in Jamaica they rose to 16·5, with a mortality of 0·4. In 1827 the wave would enter the zone beyond the isoclinal 53° N.; the admissions were fewer in the Ionian Islands and Gibraltar, though more numerous at Malta, but in 1828 they were greatly increased at Gibraltar, while at the other stations they were not materially different. In 1827 the disease was very prevalent in Chinese Tartary.† In 1828 the wave would pass the isoclinal 70° N.; Bermuda had the high ratio of 45·6 of attacks, but without any death. The ratios for Nova Scotia and Canada were much less than the preceding year, though the following one they increased considerably at both, and in Canada there was a mortality of 0·7 per 1,000.

The wave next in order would leave the isoclinal 53° S. on 1st January 1825. Neither at the Cape nor Mauritius was there much cholera this year, but in the following one the ratio was almost quadrupled at the latter. On 1st January, 1827, the wave would reach the isoclinal 0°, there was a slight increase in the admissions in Ceylon. I have no information regarding the Madras Presidency this year. In 1828 when the wave would pass into the zone beyond the isoclinal 30° N., the mortality among the white troops in the Bombay Presidency rose to 14·7 per 1,000, from 5·2 the previous year. In Bengal the mortality was increased slightly only over that of 1827, though it was very high; there was a very severe outbreak this year in Her Majesty's 14th Regiment at Berhampore, near Calcutta. In the West Indies and Jamaica the attacks were much reduced. In 1829 the wave would pass into the zone beyond the isoclinal 53° N.; both the Ionian Islands and Malta show an increase this year, and there were a few deaths among the civil population of the latter from cholera; the admissions at both stations and the deaths in the civil population of Malta, increased still further in 1830. At Gibraltar in 1829 the admissions were fewer than the previous year, though still high; in 1830 they fell still more. In August 1829 cholera again broke out in great force at Orenburg, and about the same time at Tabriz, Tiflis, and in the northern parts of Persia; and it prevailed also among the neighbouring Tartar tribes. Orenburg is so situated in this zone that the wave would reach it about 1st August. In 1830 the wave would pass into the zone beyond the isoclinal 70° N.; this year there were no attacks at Bermuda, but the following one a ratio of 161·6; in Nova Scotia the ratio was smaller than the previous year, but, as at Bermuda,

* Corbyn, p. 46.

† Copland Dictionary, Article, Pestilence Choleraic, p. 100.

increased the following one; in Canada, on the contrary, it was higher in 1830 than in 1829 or 1831. In England, among the cavalry there was a ratio of 3·0 in 1830, increasing to 5·8 in 1831. In 1830 the disease in the epidemic form which had reached Orenburg the previous year, and occupied the country from that to the Persian frontier, in this, the second year of the wave, stretched northwards on the western side of the Caspian, through the European provinces of Russia as far as Moscow and Kazan, which places it reached in the beginning of October, and where the increasing cold seems to have detained it for the winter. In 1831 the epidemic resumed its activity, and was experienced in Poland early in the year, subsequently in the northern provinces of Russia, in Germany, along the shores of the Baltic, Hamburg, north of England, Scotland, and even in Iceland.* On 1st January, 1831, this wave would be included between the isoclinal 80° N., and 53° N., thus embracing Iceland, and by 31st December the latter part of the wave would have retired over Europe as far as the isoclinal 70° N. The epidemics just mentioned, experienced this year in the vicinity of this isoclinal, are therefore to be attributed to the wave under consideration, while at the outbreaks, occurring farther south, arose under another which was following this one up, re-occupying the ground it vacated. At Warsaw, for example, the disease prevailed in April and May 1831, whereas, from its position in the zone, the advancing wave could not reach it until about the 1st September. Consequently the epidemic there must have arisen under the receding one. The increase in the ordinary and milder forms of cholera in 1830 in the Ionian Islands and Malta, and in 1831 in England, Bermuda, and Nova Scotia, as the epidemic form extended to the northward, in the corresponding zones, from the south of Russia to Iceland, affords unequivocal evidence of the different forms of the disease being intimately connected with the same general cause. Many similar instances are to be found in the course of this paper.

The next wave requiring consideration would start from the isoclinal 53° S., on 1st January, 1827. This year there were no admissions at Cape Town, but among the troops on the frontier a ratio of 5·4, and at Mauritius 10·6, which was less, however, than that for 1826 there. This wave would reach the isoclinal 0° on 1st January, 1829. Early that year there were a large number of natives from India collected at Aripo in Ceylon, for the pearl fishery; the disease appeared among them in March; it commenced among the troops at Colombo in April, and about the same time at several other places; the native Malay corps suffered chiefly. The white troops in the Madras Presidency, for whom there are returns in 1829, were not affected to a great extent this or the following year. This wave would pass the isoclinal 30° N. on 1st January, 1830, and there was an increase in the mortality both among the white and black troops in the Bombay army, though among the Europeans in the Bengal force it was less than the previous year, but still considerable. In the West Indies the ratio was less than the previous year, but the following one it rose again; in Jamaica the ratios were very low in both. This year the disease became epidemic at Cairo, producing great mortality, and extending into the following year. In 1831 the wave would pass into the zone beyond the isoclinal 53° N.; the ratio of attacks in the Ionian Islands was considerably less than the previous year, but both at Malta and Gibraltar it rose considerably, and at the former there was a mortality of 1·0, with a death among the civil population, and a case in a Marine of Her Majesty's ship Madagascar, which proved fatal in eight hours.† In May 1831 the epidemic appeared in Hungary, and continued during the summer. Hungary is so situated in this zone that the wave would reach its southern part about the 13th April, and the mountains to the north about the middle of July. Consequently, this epidemic must be attributed to the advancing wave, and not to that under which the disease was prevailing farther north at this time. In 1831 cholera continued in Egypt; it affected Smyrna and Constantinople, and seems to have been epidemic at Ningpo in China.‡ In 1832 the wave under consideration would pass into the zone beyond the isoclinal 70° N. This year the disease became epidemic in

* "British and Foreign Medical Chir. Review," vol. v, p. 464, *et seq.*

† Statistical Reports on the Health of the Navy, 1830-36, p. 159, 8vo. edition.

‡ Milne, l. c., p. 484.

London and the southern parts of England, and extended into Ireland on the one hand, and France on the other; it commenced in London in February, in Dublin in March, at Calais and Paris in the same month, and extended so far south as Bourdeaux. In 1832 also, cholera appeared in America in the epidemic form; it was first met with at Quebec on 8th June, at Montreal on 10th June, New York 24th June, and, after affecting the intermediate space, broke out at New Orleans about the middle of October; the first three being under the first year of this wave, the last under its second year. In 1833 the disease was again epidemic in Iceland.

The next wave for examination would leave the isoclinal 53° S. on 1st January, 1829. Cape Town showed a very low ratio of attacks this year. Among the troops on the frontier it was higher, while both the preceding and following year there were none. At Mauritius the attacks were five times more numerous than either the previous or succeeding year. This wave would reach the isoclinal 0° on 1st January, 1831. The ratio of admissions in Ceylon rose from 6·9 in 1830 to 18·8, and of the deaths to 0·9; but the disease cannot be said to have been epidemic. Early in 1832, however, a slight epidemic was experienced. The ratio of mortality among the white troops in the Madras Presidency from cholera, rose in 1831 to 8·4, from 3·9 the previous year; and in 1832 it was 21·1. The wave would enter the zone beyond the isoclinal 30° N. in 1832 The ratio of mortality among the white troops in the Bombay Presidency this year was 7·1, about three times greater than in 1831. The natives did not present any material increase, but the prisoners in the jails showed a large one, which went on into 1833. In Bengal the mortality among both Europeans and native troops was low in 1832, among the former it was quadrupled in 1833. In 1832 the admissions in the West Indies rose to 25·9 per 1,000, from 10·9 in 1831. In Jamaica there was a slight increase. The wave under consideration would be at the isoclinal 53° N. on 1st January, 1833, and overspread the zone beyond it in the course of that year. The admissions among the troops were slightly increased in the Ionian Islands, but diminished at Malta and Gibraltar. Cholera in the epidemic form, however, appeared at Lisbon in June, cases having occurred in some of the British ships of war in the Tagus as early as April. The disease also became epidemic in Cuba, commencing at Havanna in February. This place, it will be seen, is just to the south of the isoclinal 53°. It appeared again in New Orleans, though less severe than the previous year. The city of Mexico was attacked in 1833, and Vera Cruz, on the coast, in August; and the ratio of admissions in Jamaica rose from 1·0, with no death, in 1832 to 6·9, with a mortality of 0·4. This year one of those instances occurred of the crew of a ship at sea being affected, if not with the disease in its epidemic form, at least with one of the milder varieties. H.M.S. "Wasp," proceeding from England to Bermuda, had got a little to the south of Madeira early in October, when, between the 2nd and 10th of that month, 26 cases of cholera presented themselves, of which four terminated fatally.* As by the 1st of October the advancing edge of this wave would have reached a line from Ushant to the island of Terceira in the Azores. The "Wasp" was pretty well into it at the period of this outbreak. In 1834 the wave would pass into the next zone to the north. This year Sweden and Norway experienced the disease in its epidemic form for the first time, and it showed itself partially in Berlin and other parts of Prussia, in England, and in Canada, and the United States. Nova Scotia, which had escaped in 1832, was now affected, and Bermuda showed a considerable increase of the milder form of the disease. Though Lisbon had suffered in 1833, in Spain the disease was not very prevalent before 1834, when it spread all over it, and across the Straits of Gibraltar into Morocco. In 1834, too, the ordinary forms of the disease were considerably more frequent at Malta, and it was epidemic at Gibraltar for the first time.

The wave following that just described would leave the isoclinal 53° S. on 1st January, 1831. This year there was an increased number of attacks, both at Cape Town and on the frontier; but at Mauritius they were fewer. The wave would reach the isoclinal 0° in January 1833. There had been rather a severe outbreak in Ceylon in the latter part of 1832; but as it had almost ceased by 1st of November, it must be set down to the previous wave. There

* Statistical Reports on the Health of the Navy, 1830-36, p. 114.

were some deaths at Kandy, however, about 20th December which would come under this one. In 1833 the mortality among the white troops in the Madras Presidency was higher even than the previous year. In 1834, when this wave would pass into the zone beyond the isoclinal 30° N., the mortality from cholera was considerably reduced among the white troops, and in the jails, both in the Bengal and Bombay Presidencies; but among the black troops in both it was somewhat increased. This year the disease was violent in the lower districts of Abyssinia, the second year of the wave there; whether it had shown itself the previous one I have not been able to ascertain. In 1835 the wave would pass into the next zone. The admissions from the ordinary forms of the disease were less numerous in the Ionian Islands, Malta, and Gibraltar, but it appeared epidemically in the south of France, commencing at Marseilles in June; it extended up the valley of the Rhine as far as Valence, and attacked Piedmont, and the northern part of Italy to the Adriatic; its influence was experienced as far south as Rome and Naples. Alexandria, in Egypt, had a slight attack this year. In 1836 the wave would pass the isoclinal 70° N. There was an increase in the attacks at Bermuda, but in England, and Nova Scotia, and Canada, they were less. This year, the second of the wave in the Mediterranean, the epidemic form of the disease prevailed throughout Italy, and in Sicily with great severity. At Malta, where I then was, about eight cases occurred one night, during the hot weather, among the men of the 59th Regiment quartered in the Cotonera district, all of which recovered. It seems to have been epidemic, also, at Havanna. In 1837, the second year of the wave in the next zone to the northward, there was an increase of cholera among the troops in Bermuda, Nova Scotia, and England; while in the last there was the limited outbreak in the Dreadnought hospital ship in the Thames in October. The disease seems also to have prevailed at Dantzic, Berlin, and other places in the north of Germany during the autumn.

The wave next in succession would leave the isoclinal 53° S. on 1st January, 1833. Neither Mauritius nor the Cape Stations, however, give any indication of it. It would be at the isoclinal 0° by 1st January, 1835. The admissions in Ceylon this year, as well as the deaths among the white troops in the Madras Presidency, were very low. On 1st January, 1836, the wave would pass the isoclinal 30° N. The mortality among the white and coloured troops in the Bombay Presidency was very small this year, but among the prisoners it rose to 9·4, from 1·6 the previous year; and, in 1837, while it maintained the same rate among the prisoners, the troops of both descriptions showed a large increase. In Bengal in 1836, the white troops retained the same ratio as in 1835, but the black troops and prisoners both showed an increase, and the following year the ratios of both white and black troops were largely augmented, while the prisoners had a decrease. In 1836 the ratio of attacks in the West Indies was doubled; in Jamaica also it rose considerably. Cholera broke out in the epidemic form in Central America, causing great mortality, especially in the district of St. Salvador on the Pacific side; it commenced at Belize, Honduras, on 6th September. This place, the chief town of the settlement, is so situated that the wave would reach it about 21st July. The disease continued to appear in various places in Egypt in 1836. In 1837 the wave would pass the isoclinal 53° N. Cholera then became epidemic in Malta; it affected Sicily, Naples, Rome, and south of Italy very severely; it was likewise experienced in northern Italy and south of France. It also continued in various parts of Egypt to a slight extent, and was experienced in the northern part of Syria and Armenia. In 1838 the wave would pass into the zone beyond the isoclinal 70° N. The attacks at Bermuda were more numerous than in 1837. In Nova Scotia there was a diminution. In Canada they remained much as before. In England the troops had smaller ratios of admissions, and the Registrar-General's returns, which became available this year for the first time, show a mortality from cholera of ·02 per 1,000 living; but there was the severe outbreak in the House of Industry at Coventry on 7th January, 1838, which caused 55 deaths up to 2nd February.*

The next wave requiring attention started from the isoclinal 53° S. on 1st January, 1835. This year there were 33 attacks among the troops at Cape Town, giving a ratio of 56·3 per 1,000; of these there were 18 between 1st January and 31st March, and 15 from 1st April to 30th June. One of the

Kaffir wars was going on this year, and there were large numbers of levies in the field on the frontier; in one body of these, mustering 2,221, there were 23 cases of cholera in the quarter ending 30th June; and in another, with 1,535 men, there were 16 cases in the same period. The disease was thus common in Cape Town, and on the frontier 600 miles distant, and among men comfortably lodged in barracks, as well as those exposed in the field. There seems, however, to have been no death from it. In Mauritius there was no attack in 1855, but in 1836, 2 or 1·3 per 1,000, both of which were fatal. This wave would reach the isoclinal 0° on 1st January, 1837; it will be remembered the period for closing the returns of sick for the British Army, which up to 1836 had been the 20th December, was then changed to 31st March the following year. At the Cape and Mauritius, as January, February, and March, are the sickliest months, this has the effect of causing a considerable portion of the sickness due to the second year of the two, to appear as if it had arisen during the first. In Ceylon the same takes place to some extent. It has the same influence on the distribution of the mortality, as if the corresponding isoclinals had been removed to to the north to the position they would occupy on 31st March. As the sickly period for cholera, throughout most of the rest of the northern hemishere is subsequent to 1st April; the results there are not materially influenced by this change. Bearing this explanation in mind, it will be seen there was little cholera in Ceylon in 1837; but in the Madras Presidency the troops showed a very considerable increase of mortality from it. In 1838 the wave would pass the isoclinal 30° N. The white troops and prisoners in the Bombay Presidency both showed a greater mortality this year; the black troops rather less. In Bengal the same took place, only the increase was considerably greater. This year cholera was epidemic in Egypt to a moderate extent. The returns for the West Indies having closed with 1836 the influence of the wave cannot be traced there. This wave would leave the isoclinal 53° N. on 1st January, 1839. The ratio of attacks in the Ionian Islands and at Malta was increased, and at Gibraltar it remained nearly as high as the previous year. On 1st January, 1840, the wave would pass into the zone beyond the isoclinal 70° N. At Bermuda there was a low ratio of attacks against none the previous year. In Nova Scotia it was lower than in 1839. In Canada there was a trivial increase, but with two deaths. There were also some deaths in 1840 at Gibraltar, and in the Ionian Islands. On the home station the foot guards and infantry both had a slight increase in the attacks, the latter with a death; and the millesimal ratio of mortality from cholera among the population in England, which, in 1838 and 1839 respectively, was ·02 and ·03, rose this year to ·05, declining the following year to ·03; and in London the deaths from cholera were 66 in 1840, declining to 28 in 1841. Thus, though the influence of this wave in England and Canada was extremely slight, yet it can be distinctly traced by the fluctuations of mortality, brought out by the system of registration which came into use in 1838.

The next wave would leave the isoclinal 53° S. on 1st January, 1837. There was a slight increase in the ratio of attacks at Mauritius, which was almost maintained the following year, and with some mortality. In the Cape Colony the ratio was very low in 1837–8, but increased the following year. This wave would reach the isoclinal 0° by 1st January, 1839. This year there was little cholera in Ceylon, but in 1840 a severe epidemic. The returns unfortunately are not available from 1839 to 1841 for Madras, so that the progress of the disease there cannot be traced. In 1840 the wave would pass the isoclinal 30° N. The mortality in the Bombay Presidency was much reduced, both among the troops and prisoners, and fell still more in 1841. In Bengal the white troops had a large increase of mortality, the black force a moderate one, and the prisoners a reduction of it. All these classes had a slight increase in 1841. The latter year cholera was epidemic in some parts of China, and at Barbados, where I was then serving; two cases occurred at a considerable interval in the 47th regiment to which I belonged, one of which was under my immediate care, and in addition to the watery vomiting and purging, with cold, blue, shrivelled, clammy surface, had cold tongue and breath; weak, husky voice; and suppression of urine. The case, in short, presented every symptom characteristic of the epidemic form of the disease. The collapse continued almost twelve hours, when it gradually passed off, and the man recovered. In 1841 the wave would

pass into the zone beyond the isoclinal 53° N. The attacks, however, in the Mediterranean stations this year were few. In 1842 it would pass the isoclinal 70° N. Bermuda, Nova Scotia, and Canada show lower rates, though with a death at the last. On the Home station, however, there was an increase in the three descriptions of troops, and the mortality in England was three times greater than in 1841, and the deaths in London rose to 126 from 28 the previous year.

The next wave would leave the isoclinal 53° S. on 1st January, 1839. At Mauritius this year the ratio of attacks was low, but the mortality considerable in proportion. In the Cape Colony the attacks were few, without any death. This wave would be at the isoclinal 0° on 1st January, 1841. There was very little cholera in Ceylon this year. On 1st January, 1842, the wave would reach the isoclinal 30° N. There was a considerable mortality among the troops in the Madras Presidency this year. In that of Bombay the ratio among the white troops rose to 55·5 from 4·0 the previous year; and among the prisoners to 31·1 from 3·9. Among the native troops there was also a large increase. In Bengal the ratio among the white troops was greatly increased, and those for the black troops and prisoners were higher. This year, also, cholera continued in China, at Tinhae; it spread southward through the Burmese territory, and reached Mergui, some distance to the north of the isoclinal 0°, in January, 1843. The disease prevailed likewise in the Philippine Islands in 1842. In 1843 the wave would pass the isoclinal 53° N. This year the Mediterranean stations show little of the disease. In 1844, when it would pass the isoclinal 70° N., the ratio of attacks at Bermuda was lower than in 1843, but with some mortality. In Nova Scotia and Canada the attacks were somewhat more numerous, but the force of the disease there, as well as in England, was small.

At the beginning of 1841 the next wave would leave the isoclinal 53° S. The millesimal ratio of attacks at Mauritius this year was 4·1, and of deaths 2·0. In the Cape Colony there was no attack. This wave would reach the isoclinal 0° on 1st January, 1843. The attacks among the troops in Ceylon were increased five-fold this year, and there was a mortality of 5·9, there having been no death in 1842. The ratio in the Madras troops was higher than the preceding year, and the disease, it is believed, spread through the Malayan peninsula. In the commencement of 1844 the wave would pass the isoclinal 30° N. This year the white troops and prisoners in the Bombay Presidency both had increased ratios of mortality, that of the black troops was less. In Bengal the white troops had a low ratio, those of the black and prisoners remained much the same. The disease appeared this year, too, in Egypt, at Alexandria. In 1845 this wave would pass into the zone beyond the isoclinal 53° N. The millesimal ratio of admissions in the Ionian Islands was less than in 1844. At Malta and Gibraltar there was a slight rise. In Bengal, in 1845, the second year of the wave, there was a very high mortality among the white troops, and a largely increased one among the prisoners. In the Bombay Presidency, at the same time, the mortality among the prisoners rose very considerably, while the black troops also showed a large increase, and the white troops but a moderate one. During 1845 the disease in the epidemic form was extremely frequent in the Punjaub and north-west provinces of Bengal, and invaded the hill districts; it affected Cabul, and extended through Persia as far as the Tigris, and is said to have been at Bokhara in November. In 1846 this wave would pass into the zone beyond the isoclinal 70° N. At Bermuda there was a small ratio of attacks following none the previous year. Both Nova Scotia and Canada showed largely increased ratios, with some deaths at each. On the Home station the attacks were more numerous among the troops, with a death in the infantry; and in London the deaths, which in 1845 were 43 only, rose this year to 228. There were then in England, and in the British American provinces, distinct indications of this wave, though, in countries to the southward, it was only under its second year that the full force was displayed. At the commencement of 1846 the wave would occupy the space between the isoclinal 70° and 30° N., and the latter part of it would not reach the isoclinal 53° N. until the end of that year. Accordingly, manifesting the intensity it did the previous year in northern Hindostan, it broke out at Teheran in May; in October it was at Salian, and Sankeran, Russian frontier towns north of the

Caucasus, and in several places in Armenia. It also traversed the country of the Kirghis Tartars, between the Sea of Aral and Orenburg, in 1846; and in the Ionian Islands the ratio of deaths was greatly increased, and there was some mortality from it. In 1847 the southern limit of the wave would gradually retire over the space between the isoclinals 53° and 70° N. This year the cholera in its epidemic form appeared in Moscow in the beginning of September. This city is so placed in this zone that the advancing wave would reach it about the 6th of November; consequently the outbreak must be attributed to the retiring one.

The next wave, in succession to that just traced, would leave the isoclinal 53° S. on 1st January, 1843. There was very little cholera either at Mauritius or in the Cape Colony this year. The wave would reach the isoclinal 0° at the commencement of 1845. There was this year an epidemic in Ceylon, which was much more developed the following one. In the Madras Presidency the ratio of deaths from cholera rose from 4·1 in 1844 to 9·9. In 1846 the wave would pass into the zone beyond the isoclinal 30° N. The mortality among the white troops in the Bombay Presidency, this year, was 51·9; the blacks had very little, but the prisoners had nearly the same ratio as in 1845. The outbreak at Kurrachee, in June 1846, occurred under the advance of this wave. That place is very little south of the isoclinal 30° N., and consequently would be under its operation from the end of the previous year; but here, as elsewhere, though sporadic cases had been occurring for some time before the great outburst of the epidemic, that did not take place until the weather had become very hot and oppressive. The disease was also epidemic at Aden and Mecca in 1846, and in the course of that year extended to the northward, appearing at Ispahan and Bagdad in September, Mosul in October, and Aleppo in November. The wave would reach Ispahan about 15th June, Bagdad about 12th July, Mosul and Aleppo about 10th September. It is said to have been at Diarbekir in autumn. The wave would reach that place about 18th October; and if any cases occurred previous to this, they were attributable to the preceding one. In the beginning of 1847, the advancing wave would pass into the zone beyond the isoclinal 53° N., and the disease proceeded to the northward, through Russia. It commenced at Tiflis, to the south of the Caucasus, on 5th May; at Kislar on the Terek, where it falls into the Caspian, in the end of that month. Its subsequent progress, with the dates at which the wave would reach each place, are as follow :—

Town.	Commencement of Epidemic.*	Date of Wave Reaching.
Kizlar	May, end of	About March 1st.
Astrachan	June 21st	„ April 10th
Tscherskask	July 13th	„ May 6th.
Zaritzin	August, middle of ..	„ June 6th.
Kharkof	„ 23rd ..	„ „ 27th.
Kiew	October 5th	„ July 15th.
Voronsk	September 5th ..	„ „ 24th.
Saratof	August 25th.. ..	„ „ 27th.
Mohilew	October 18th.. ..	„ Sept. 21st.
Zimbirsk	Sept. 15th	„ „ 24th.
Kasan	„ 17th	„ Nov. 3rd.
Moscow	„ beginning of ..	„ „ „

From this Table it is apparent that up to Mohilew, and possibly Zimbirsk, the epidemic did not commence until after the arrival of the wave under consideration, while at Kasan and Moscow cases were frequent at an earlier period. These evidently arose under the latter part of the preceding wave, as has been shown to have taken place elsewhere under corresponding circumstances. A

* These dates are taken from the "British and Foreign Medical Chirurgical Review," vol. iii, p. 9. At Astrachan there seem to have been cases in May, though the disease did not become epidemic until later.—"British and Foreign Medical Chirurgical Review," vol. xxxvi, p. 443.

line passing from a little to the north of Voronetz, through Saratof, to Orenburg, will give the position of the advancing edge of the wave about the 1st August; and while the epidemic commenced at the two former in the end of August or beginning of September, on this occasion, by referring back it will be found it made its appearance at Orenburg, in 1829, in August, which bears out the notion that this is about its position in the beginning of that month. Towards the end of 1847, sporadic cases of cholera had occurred in Malta and other places in the Mediterranean, and in France; and, during the winter months, the south coast of the Mediterranean, and the west of Europe between the isoclinals 53° and 70° N., was affected with an epidemic of diarrhœa. In 1848, the wave would pass into the zone beyond the isoclinal 70° N. This year the cholera was epidemic at St. Petersburg and in Finland. In the beginning of October it commenced at Bergen in Norway, and about the same time in England and Scotland; and about the middle of November at Belfast. At this time, too, one of those instances of the disease breaking out in a ship at sea occurred, which have been alluded to above. The packet ship "New York," with emigrants on board, left Havre on 9th November for New York, at which time no case of cholera had occurred at the port of departure. On the 25th November the disease showed itself amongst the passengers. On the arrival of the ship at her destination, the disease did not extend beyond the hospital on Staten Island, to which the sick were sent. Another ship, the "Swanton," left Havre on 2nd or 3rd November, with emigrants for New Orleans. When 26 days out, a case of consumption proved fatal. After this there were 16 or 17 deaths, supposed to have been from dysentery. The ship arrived at New Orleans on 11th December. On the 12th a case of cholera was sent to hospital from her; on the 13th another; and the same day other persons were attacked, none of whom were passengers by this ship.* . The disease occurred elsewhere in this neighbourhood at this time, the circumstances attending which deserve mention. The 8th Infantry (United States Army) left Jefferson Barracks, near St. Louis on the Mississippi, on 24th November, and reached New Orleans on 1st December, where they remained in sheds till the 12th, when they embarked in steamers for Lavacca in Texas, and arrived there on the 15th. The disembarkation was not completed till the 19th December, when they were encamped on a brackish bayou or creek. On the 21st a wing was advanced about 12 miles to a more favourable locality; that night "cholera showed itself in both c amps, and by the morning of the 22nd had attacked more than one-eighth of both commands. The disease continued with great violence during the 22nd, 23rd, 24th, and 25th, when it began to abate; by the 30th it had entirely subsided." There were 133 deaths out of 196 cases.† These occurrences, in 1848, were all within the limits of the wave which passed the isoclinal 70° N., on the 1st January of that year; by 1st January, 1849, its advancing edge would have reached the isoclinal 80° N., while the posterior margin would be near that of 53°, still considerably south of New Orleans or Lavacca; and it will be shown below that a fresh wave followed this one in the early part of 1849, the operation of which can be traced distinctly, step by step, from 53° N. In 1849, the epidemic prevailed to a much greater extent in England than the previous year, attaining its maximum in London in September, and disappearing in December. The northern parts of France were affected this year; Paris suffered most in June. In America the disease spread to the northward with great rapidity, after its appearance in New Orleans in the middle of December 1848. It was at Memphis towards the end of that month, at St. Louis in the first week of January following, and at several other places on the Upper Mississippi in March; and Chicago and the towns on the chain of the great lakes were affected in May. New York and the seaboard were attacked about the same time. It prevailed in Canada chiefly from July to September. The disease was frequent among the emigrants to California in 1849; and cases were met as far west as Fort Laramie, in lat. 42° 12′, and long. 104° 31′ W. This diffusion of the disease, from New Orleans in the middle of one zone to

* "British and Foreign Medical Chirurgical Review," vol. iv, pp. 274–5, from "American Journal of Medical Science," April, 1849.

† Statistical Report on the sickness and mortality in the army of the United States.—Washington, 1856, p. 398.

Chicago in the middle of the next, in a few months, which contrasts so strongly with its measured progress within the advancing wave, is explicable by the position of the wave at the time, which embraced all these places, and favoured the development of the epidemic everywhere within its limits, as soon as the necessary local conditions came into operation.

Another wave would start from the isoclinal 53° S. on 1st January, 1845. This year there was a slight increase in the attacks at Mauritius and the Cape, with some mortality at the former. The wave would reach the isoclinal 0° by 1st January, 1847. This year the disease was still prevalent in Ceylon, though less so than in the previous one; but, for the reasons specified above, the returns do not give the mortality correctly for the year ending 31st December. The troops at Madras show a ratio considerably lower than the previous year. In 1848 the wave would pass into the zone beyond the isoclinal 30° N. The mortality this year was very low among the three classes in the Bombay Presidency, but the following year each displayed a great increase. In Bengal, in 1848, the ratio of deaths among the European troops rose to 6·5 from 4·3 the previous year; the native troops remained unchanged, and the prisoners rather receded. In 1849, however, both European troops and prisoners showed greatly increased ratios, while in the native troops there was a diminution. In 1848 the disease was prevalent in Alexandria and Syria, both of which would come under this wave. In 1849 the wave would pass into the zone beyond the isoclinal 53° N. This year the disease became epidemic in the south of Europe. It appeared at Marseilles in August, and soon afterwards at Toulon, Nice, Genoa, Leghorn, and as far south as Naples. It continued in Egypt this year, and towards the end of it affected Tunis, Oran, Algiers, and other places on the north coast of Africa. In America, the advance of this wave was well marked, the isoclinal 53° N. passes just to the north of Matamoras in the Gulf of Mexico, and the information in the Statistical Report on the Health of the American Army shows its progress in the vicinity very well. Towards the end of December 1848, a schooner arrived at the mouth of the Rio Grande from New Orleans, with forty Mexicans and three families on board. Some cases of cholera occurred in her while detained at that place, three of which were treated in the hospital of the American troops at Brownsville, opposite Matamoras, but no case followed then. Apparently, some time early in February, diarrhœa became common in that locality; and cholera appeared at Matamoras about 20th February, and at Brownsville two days after. The disease continued at these places for about a month, and carried off nearly one-fifth of the population at each.* The disease subsequently extended along the Rio Grande, and appeared in Texas and the Southern States. The dates of its occurrence at Ringgold Barracks and Fort M'Intosh on the Rio Grande, and at San Antonio in Texas, with the periods of the arrival of the wave at each, were as under:—

Place.	Cholera Appeared.	Date of Wave Reaching.
Brownsville	February 22nd ..	December 20th
Ringgold Barracks ..	March 2nd	January 1st.
Fort McIntosh ..	„ 16th	„ 22nd.
San Antonio	April 11th	March 6th.

The disease prevailed extensively in New Orleans in 1849, but I have no information as to whether it was continuous from the first outbreak in December 1848, or whether it subsided as the retiring wave went northward, and increased again as that under consideration advanced. At Fort Gibson, on the Arkansas River, in lat. 35° 47′ N., long. 95° 10′ W., a mild form of cholera prevailed in July and August 1849, but with several cases of the epidemic form of the disease.† The advancing wave would reach Fort Gibson about 12th September only, consequently this outbreak must be attributed to the retiring one, under the influence of which that place still was. In 1849, one of those cases of a ship at sea being attacked with cholera, some time after sailing, presented

* Statistical Report United States Army, p. 366–7.
† Ibid., p. 280.

itself, which requires to be noticed here. Her Majesty's ship "Apollo" received on board the 59th Regiment, numbering 593 persons, at Cork, on 11th June, 1849, for passage to Hong Kong, and sailed on the 17th. Cases of cholera had occurred in the barrack from which the regiment came, if not among its men, a short time previously; and the disease had also been prevalent in the neighbourhood, but there had been none in the ship herself. On the 18th a case of cholera showed itself, and proved fatal in a few hours. The next well-marked case was in a woman, who was attacked on the 26th, who recovered. On the 29th a soldier showed the disease, and died in a few hours. The ship reached Madeira on the 29th, and, being refused pratique, after a trivial delay proceeded to Teneriffe, and anchored at Santa Cruz on 1st July. When she sailed from Teneriffe is not mentioned, but on 24th July she crossed the line, and on 7th August arrived at Rio Janeiro. The course of the disease in July and August was as follows:—

	Attacks.	Of which Died.
July 2	1	..
„ 5	1	..
„ 7	1	..
„ 8	1	..
„ 9	1	..
„ 10	1	..
„ 16	1	1
„ 18	1	1
„ 19	6	4
„ 20	3	2
„ 21	2	..
„ 22	1	..
„ 23	2	..
„ 29	2	2
„ 30	2	2
„ 31	1	..
Aug. 5	1	1
„ 11	1	1

Diarrhœa was very common during this period; in some cases so severe that it was doubtful whether it should be so classed, or returned as cholera.* On examining these facts in connection with the position of the waves at the time, the following relations are elicited:—The northern part of Europe, the British Islands, and the greater part of the United States, were under the influence of the retiring wave; the Mediterranean and southern part of the United States under the operation of an advancing one; and on the 1st July the line of separation between these, in the eastern part of the Atlantic, would extend from the coast of Portugal, midway between Lisbon and Oporto, to a point midway between Madeira and the nearest of the Azores. On the 24th July, when the ship crossed the Equator, the line of separation between this wave and that next following (of the existence and influence of which evidence will be given below), would extend from a little south of Cape Palmas on the African coast, to a little south of Cape San Roque on that of South America. Now, comparing the appearance of the disease with the ship's position, it is found that the first case showed itself when she was in the first-named wave, just after going to sea; the second was on the second day before reaching Madeira, when she had almost certainly encountered the advancing wave, from which time cases appeared with considerable regularity to the 10th July, but it will be observed with but one death. There was then a respite until the 16th, when the disease commenced afresh, and continued until the day before the ship crossed the Line, with considerable mortality. In the absence of the position each day, the full significance of these changes cannot be appre-

* Bryson on the Infectious Origin, and Propagation of Cholera (London, 1851), p. 27, *et seq.*

ciated; but as the trade winds, in the end of July, cease far north as the Cape de Verde Islands, and from that to the Equator hot, moist, close weather prevails, the aggravation of the disease at this period was most probably influenced thereby.* From the 23rd to 29th July there is another absence of the disease, corresponding to the interval between the passage of the ship out of this wave and her running into that following it. The outbreak in the new wave was not so serious as under the previous one, but still was marked enough to show the fresh action of the causes, and the alternations in that action, corresponding as they do with the relative position of the ship to the waves she encountered, cannot be fortuitous.

In 1850, the wave, which was traced in 1849 beyond the isoclinal 53° N., would pass into the zone to the north of that of 70°. Cholera prevailed epidemically in Sweden, Norway, and Denmark. England suffered comparatively little this year. In America it prevailed in the Northern States, from Halifax westward as far as Fort Laramie, on the eastern slope of the Rocky Mountains, when both troops and emigrants suffered considerably this summer. In the Mediterranean, though under the second year of the wave there, cholera was very frequent in 1850. It reappeared in Tunis in spring, and attained its greatest force in June; Tripoli had it very severe about July; Malta was attacked in June, and the epidemic continued till October; Cephalonia, one of the Ionian Islands, was affected very severely in August. In the western hemisphere, Havanna, and many other places in Cuba, were very sickly during the summer. The disease was also frequent in the Southern States of America, and severe in Sacramento in California. Mexico also was attacked severely this year, but at what period I have no information. At Vera Cruz it commenced in August, which will bring it under the next wave, as will be shown below. In 1851 there was still a good deal of the disease in America, beyond the isoclinal 70° N., under the second year of the wave.

The wave next in succession to that just described would start from the isoclinal 53° S. on 1st January, 1847, but neither at the Cape nor Mauritius was there any indication of unusual activity in the causes of cholera. This wave would reach the isoclinal 0° on 1st January, 1849. That year there was less of the disease in Ceylon than the previous one, apparently, but the white troops in Madras show a moderate increase of mortality. In the Atlantic the operation of this wave is indicated by the occurrences in the "Apollo" from the 29th July, which are detailed above. In 1850, this wave would move on from the isoclinal 30° N. In the Bombay Presidency the mortality among the white troops was less than in 1849, but among the natives and prisoners there

* The "Resistance" was a frigate built ship, having beneath the upper or weather deck the main or gun-deck, and the lower or orlop deck. The crew occupied the starboard side of the main deck, and the troops the port side and the orlop. There were two wide tubes on each side, to permit heated air to escape from the orlop, but, instead of being carried through the upper deck, they opened on the main deck, and merely relieved the lower one of its foul air, at the expense of that above it. These tubes remained closed until the 17th July. On the 19th the first cases occurred among the crew, none of whom were attacked except in the messes nearest these tubes and the main hatchway. The author attributes the cases among the crew, on and after the 19th, to the contagious effluvia which passed from the orlop to the main deck, through these tubes and the hatchway; but, inasmuch as the hatchway must have been open from the commencement of the voyage, and as no cases had appeared in its neighbourhood before the 19th, something else must have come into operation, from about the 16th, when the causes assumed a more virulent form than had been acting before, and determined the attacks on the main deck, wherever the conditions were unfavourable. That the foul air from the orlop acted injuriously on those berthed on the main deck there can be no doubt, but it appears to me the evidence in this case, taken by itself, does not permit of its being decided, satisfactorily, whether that effect was due to a contagious virus given off by those living on the lower deck, or to the foulness caused by a large number of persons occupying a limited space, the air of which was not changed with sufficient frequency, or whether it arose from emanations from the hold, or the last two combined. In the cases of the "Mangles" and "Wasp," already mentioned, emanations from the hold were very likely concerned in originating the disease; and in that of the "Renown," to be noticed hereafter, this really seems to have been the immediate exciting cause, unde he influence of the wave, accompanied by favourable meteorological conditions.

was an increase. In Bengal, with the exception of a small increase among the native troops, the mortality was less than the previous year. There was a good deal of the disease in the southern parts of China and in Cochin China, in 1850. It also appeared in Cairo, Alexandria, and at Suez, which suffered severely from July onwards. The wave would reach Suez about 1st May, and Cairo a day or two later, consequently these outbreaks are to be attributed to the advancing wave, while that which commenced in July at Tripoli, which place it would reach about 18th October only, must be set down to the retiring one. In the early part of the summer of 1850, cholera prevailed at Bogota, the capital of Caraccas, Santa Martha, and Carthagena, in the northern part of South America, as well as in many villages along the Rio Magdalena. Some time later, Chagres and other places on the Isthmus of Panama were affected also; in August, the epidemic commenced at Vera Cruz, which place the advancing wave would reach about the 1st of that month. On 7th October, it appeared at Port Royal, in Jamaica, which the wave would reach about 1st September; the epidemic was very severe in Jamaica for the remainder of the year. In 1851 the wave would overspread the zone beyond the isoclinal 53° N. Cholera broke out in the epidemic form in the Grand Canary, one of the Canary Islands, about the beginning of June; it appeared also in Algeria in July. It also appeared in Poland and Silesia, from August to the end of the year; the wave would reach the southern part of Poland about 1st August. The disease continued in Cuba during the early part of the year. According to Barton, there was a mortality of 645 in New Orleans, from cholera, this year,* though only about half as many as in the preceding or following years. In 1851, I was at Sierra Leone, where, in April and May (under the second year of the wave), a great deal of painless diarrhœa, with frothy light-coloured evacuations was met with; during this period two cases of cholera occurred in Europeans, one of which was under my own care. This presented the usual watery evacuations, complete collapse, alteration of voice, and suppression of urine, though recovery ultimately took place. In 1852, the wave would pass the isoclinal 70° N. in January. Cholera appeared late in the year in St. Petersburg, and in other parts of Northern Russia. In England and Wales the millesimal ratio of mortality from cholera rose from ·06 in 1851 to ·08. There was a slight reappearance of the disease in Canada during the autumn, and in the northern part of the United States. This year also, to the south of the isoclinal 70°, cholera was very severe in Poland, and prevalent in Prussia. The Bahama Islands became affected for the first time in September, and the deaths at New Orleans from this disease rose to 1,326. In 1853, under the second year of the wave, cholera continued to prevail at St. Petersburgh, Abo, Helsingfors, Riga, Moscow, also in Sweden, Norway, Denmark, Prussia, and Holland; to the south of the Baltic the disease ceased about September, in Sweden it appears to have extended into October. In London it appeared in August, and at Newcastle, soon afterwards, there was a severe outbreak. The disease was also met with in New York, towards the end of the year.

The next wave would leave the isoclinal 53° S. on 1st January, 1849, but, like the previous one, there was no distinct trace of it at either the Cape or Mauritius. In the commencement of 1851 it would be at the isoclinal 0°. The force of the disease, this and the following year, was very small in Ceylon and Madras. The wave would be at the isoclinal 30° N. on 1st January, 1852. Both classes of troops and the prisoners in the Bombay Presidency show very little mortality this year, though there was an increase the following one. In Bengal the troops and prisoners had a large increase in 1852, and the following year the same ratios nearly continued. On 1st January, 1853, the wave would pass the isoclinal 53° N.; the disease was very severe, in May and June, at Teheran, and ceased in August. It was at Tripoli and other places on the south coast of the Mediterranean, from April to November. In August, if not earlier, numerous places in Wallachia, Bessarabia, and Moldavia were attacked, and in Gallicia, in the Austrian Empire, it was experienced a month or two before. Cholera likewise appeared in Piedmont, in the south-eastern departments of France, and in the southern part of Portugal, and in Gallicia, in Spain, in the autumn, and at Paris in November. In the western hemisphere, New

* Barton—Cause and Production of Yellow Fever, p. 101.

Orleans was again attacked towards the end of the year, though not severely; the disease was prevailing at the same time at Havannah. Early in 1854, the city of Mexico, Jalapa, and Vera Cruz were under its influence, which continued through the spring and summer; Honduras, likewise, was affected early in the year, and there was a slight outbreak at Jamaica, terminating in May. The north-eastern group of the West India Islands, Virgin Gorda, Tortola, St. Thomas, Nevis, were attacked in the end of December 1853, the second year of the wave. On 1st January, 1854, this wave would pass the isoclinal 70° N. The disease was very prevalent in Finland this year, also at Stockholm. There was a severe epidemic in England and Scotland; it prevailed likewise in the Northern States of America, Canada, and New Brunswick; it attacked Newfoundland in August (the wave would reach St. Johns' about 24th July), and was experienced as far west as Fort Laramie, among the emigrants to Oregon, during the summer. In 1854, between the isoclinals 70° and 53°, and for some distance south of this, cholera was epidemic over nearly the whole of Europe, and in many places in the north of Africa, and in some of the islands of the West India Group, where it declined in the course of the year. At Barbadoes, the southernmost of those affected under this wave, the epidemic commenced on 14th May, 1854, and continued to August. The advancing wave would reach this island about 24th July, only when this outbreak had almost ceased. In 1855, there was not much cholera in America, though it continued in Europe, but under a new wave, which it is now requisite to trace.

This wave would leave the isoclinal 53° S. on 1st January, 1851. There were no indications of the disease among the troops either at Cape Town or Mauritius, but a case proved fatal early this year at Fort Hare, in the frontier districts of the former colony, among the levies embodied for service during the war then going on. In 1852, the wave would pass into the zone beyond the isoclinal 30° S., and this year cholera prevailed at Zanzibar and its neighbourhood, which is just to the south of that isoclinal. On 1st of January, 1853, the wave would be at the isoclinal 0°. This year there was a large increase of the disease in Ceylon, and it prevailed at Sarawak, in Borneo. In 1854, the wave would extend over the zone beyond the isoclinal 30° N. The returns for the troops and prisoners in Bombay and Bengal are no longer available, and I have no notice of the disease this year in these Presidencies. In the West Indies cholera began to appear in Granada in June; afterwards at St. Lucia, on 11th July, and at St. Vincent and Trinidad in September; it commenced at St. Kitt's, in November. At Tobago there was much choleraic diarrhœa, with a few cases running on to cholera, but none proved fatal. This wave would reach Barbadoes and St. Lucia about 24th July, and St. Kitt's about 6th October, and though a few cases may have appeared at St. Lucia earlier, the force of the epidemic does not seem to have been experienced before the end of the month. In 1855, the wave would pass into the zone beyond the isoclinal 53° N., and cholera became epidemic throughout the south and centre of Europe. The greatest sickness at Constantinople was in April and May; in the Crimea, in May and June; in Austria, between May and November; in Switzerland, in July and August; Venetia and Lombardy were afflicted at the same time; and Naples and the island of Sardinia were attacked, but to a much less extent. Lisbon was affected in October. Cholera existed in the eastern provinces of Spain in February and March; at Madrid in April and May; and on the Douro in May and June, but all these must have been under the retiring wave, as it ceased everywhere on the approach of the advancing one. To the south of the isoclinal 53° the disease continued very prevalent in 1855; it was in Egypt from May to the end of autumn, and in Palestine in October and November. The island of Fogo, in the Cape de Verde group, became affected in July; Para, in Brazil, was attacked in May, for the first time; the Caraccas, again, in the course of the year, and the island of Porto Rico, for the first time, towards its end. In 1856, this wave would pass into the zone beyond the isoclinal 70° N. The disease was at Stockholm in August this year; at Moscow, in the same month it was so severe that the Coronation of the Emperor was postponed in consequence. In England there was a mortality of ·04 per 1,000 of population only. Between the isoclinals 70° and 53°, however, the disease continued much more active. Messina was affected in July

and August; there were many cases in Malta, Cadiz; and Seville suffered severely in summer; and Lisbon and its vicinity between July and October. The northern coast of Africa, from Tripoli to Mogadore, was affected, and Madeira, and the small island Porto Santo, in its vicinity, displayed the disease this summer for the first time.

The next wave to that just traced would leave the isoclinal 53° S. in the beginning of 1853. There was no cholera at the Cape of Good Hope this year, but in Mauritius the milder form made its appearance in considerable numbers, and the following year there was an epidemic which was believed to have commenced on 15th May. In Port Louis, the chief town, it continued to August. On 1st January, 1855, this wave would have reached the isoclinal 0°. There was little cholera among the troops in Ceylon in 1854–5, but the exact period cannot be made out from the returns in the present form. I have no notice as to whether it prevailed in southern India in 1855. This year it broke out at Rio Janeiro in July, and continued to October, suspicious cases had occurred as early as the end of 1854, and beginning of 1855,* but the disease did not become general before July. In 1856 cholera spread in a very severe form through the northern provinces in India, from May to August, and extended into the mountainous districts of Nepaul and Cashmere. In 1855, Fogo, one of the Cape de Verde Islands, had been attacked. In 1856, St. Vincent, St. Antonio, St. Nicolas, and St. Jago, likewise came under the influence of the disease. At St. Vincent it commenced on 23rd August, and carried off 626 out of a population of 1,350 in the first 15 days, and 19 more in the nine days following. The force of the epidemic, therefore, seems to have been broken by the 6th September. The disease commenced in St. Antonio in September, the exact day I have not been able to find; it is said 2,000 persons died in the first fortnight there. In St. Nicholas it seems to have commenced on 11th or 12th September; and, at St. Jago, to the southward, on 3rd October.† St. Nicholas, St. Vincent, and St. Antonio are so placed with regard to each other that the wave would reach the first about 12th September, the second about 15th, and the last about the 18th, were the isoclinals, in 1856, in the same position as indicated on the map for 1840; but, as stated in the previous paper, the isoclinals move gradually to the westward, causing little difference in their geographical latitude, where they nearly coincide with the parallels, but leading to a considerable change where they are more oblique to them. A line from Great Britain along the West Coast of Africa as far as the Equator, and from thence to the Cape of Good Hope, passes through the portions of greatest obliquity, The change in dip arising from the motion, and consequently in the approximate date of the arrival of the advancing edge of the wave, would be in London:—

	1840.	1860.
Dip	69° 12′	68° 20′
Date of wave reaching ..	December 10th ..	November 15th.

or 25 days in 20 years. At the Cape of Good Hope—

	1836.	1851.
Dip	52° 35′	54° 2′
Date of wave reaching ..	January 7th	December 13th.

or 25 days in 15 years, which is considerably more than at London. As the isoclinals 30° and 53° N. on the above-mentioned line, present about the same obliquity to the parallels of latitude as that of 70° N. at London. The acceleration of the arrival of the wave at London may be applied to other places in the vicinity of this line, from the Equator northward, without any material error. The amount of this correction for the 16 years from 1840 to 1856 is 20 days, and deducting this from 15th September, the approximate date of the arrival of the wave at St. Vincent is found to be 25th August, almost the day the disease commenced there. In 1856, three cases of cholera are said to have occurred in Demerara in April,‡ but it was not before December that the disease

* Abstracts of Returns of Information on the Laws of Quarantine.—Board of Trade, 20th August, 1860, p. 34.

† Abstracts of Returns, &c., Board of Trade, 20th August, 1860, p. 13, and Hopffus in Transactions Epidemiological Society, vol. i, p. 170.

‡ Abstracts of Returns, &c., Board of Trade, 20th August, 1860, p. 73.

became epidemic. The island of Curacoa was affected this year, and also the districts of Venezuela, Costa Rica, and Nicaragua. In the next zone the force of the disease in 1857 seems to have been very small, and in 1858, when the wave would pass into the zone beyond the isoclinal 70° N. There were very few traces of the disease in the countries it embraces; but in 1859, under the second year of the wave, it appeared in Hamburg in the middle of June; at Helsingfors in middle of July; in south of Sweden in middle of August; at Stockholm on 5th September; at Rotterdam and Bruges in September; at Wick, in north of Scotland, on 8th September. There were, besides, other slight outbreaks in England, as at Woolston near Southampton, and Glass Houghton.*

In the beginning of 1855 another wave would leave the isoclinal 53° S. Mauritius this year had again a considerable mortality from cholera among the troops, which was continued into the following one, though much reduced. At the Cape there was a death from cholera in 1855. In 1856 the wave would pass into the zone beyond the isoclinal 30° S., when the disease appeared in the district of Rio Grande du Sol, the southernmost part of Brazil. The first cases seem to have occurred about the beginning of December, 1855, soon after the disease became prevalent, but the exact dates are not given. The disease appeared in St. Catherine, further north, some time in March 1856. The wave would reach the southernmost part of Brazil in the end of December 1855, and St. Catherine about 6th April, or a little earlier; and it is quite possible a few cases might have occurred at both, some time previous to the arrival of the wave and the commencement of the severe part of the epidemic. The evidence from the Cape and Mauritius leaves no doubt that the cholerific influence at this time was felt pretty extensively over the southern hemisphere. The disease continued this year in the other districts of Brazil, where it had appeared the previous year. In 1857 this wave would overspread the zone to the north of the isoclinal 0°. I have no notice of the disease in it during the period. In 1858 it would embrace the next zone, and its operation was then felt at various places: thus, at Cherra Pongee,† about 25 miles N.N.W. of Sylhet, there was a very severe epidemic. The disease was also at Murree, in the Punjaub, in June, and had been previously at Jhelam, Rawul Pindee, and Abbotabad, in the same neighbourhood;‡ but, as noticed in the case of the 93rd Highlanders above, these outbreaks must have been under the wave which preceded that under consideration. In 1858 cholera visited Hong Kong in rather a severe form; it was also met with to a limited extent among the Pilgrims from Jeddah to Mecca. On 1st January, 1859, this wave would pass the isoclinal 53° N. Cholera made its appearance among the French in Algiers, and in the Spanish army in Morocco; it also appeared, early in August, in the province of Murcia in Spain. This year, also, there were several sporadic cases and one death, near Kingston in Jamaica. In 1860 the wave would overspread the zone beyond the isoclinal 70° N. The force of the disease seems to have been small this year in the north of Europe and America, though, in Nova Scotia there was a small ratio among the troops. The disease, however, continued among the Spanish forces in Morocco. It appeared also at Malaga, in Spain, and among the troops both at Gibraltar and Malta.

The wave following that just traced would leave the isoclinal 53° S. on 1st January, 1857. This year the attacks were very few at Mauritius or the Cape. In the beginning of 1859 the wave would reach the isoclinal 0°. The disease was less among the troops in Ceylon than it had been the previous year, but the attacks were still pretty numerous. I have no record of its prevalence this year in the neighbouring continent. In 1860 the wave would gradually overspread the zone to the north of the isoclinal 30° N., and there was a high rate of mortality from cholera among the white troops, both in the Bombay and Bengal Presidencies, and one of 7·8 per 1,000 of attacks, with 7·0 of deaths among the white troops in South China. In December this year it appeared at Teheran, and is said to have prevailed some time previously at Yezd, Koom, and Kasbin. On 1st January, 1861, the advancing edge of this wave would leave the isoclinal 53° N. The troops in the Mediterranean stations showed no

* Transactions Epidemiological Society, vol. i, p. 11, *et seq.*

† Chevers' Indian Annals, No. xi, p. 341.

‡ Chevers, *loc cit.*, p. 281.

trace of the disease except at Malta; and elsewhere in this zone, in this year, there seems to have been very little activity of the causes of the disease. In Bengal, now under the second year of the wave, the mortality among the troops was doubled, and the disease seems to have been very prevalent from Calcutta to Lahore. In the Bombay Presidency, on the other hand, the mortality among the troops diminished to less than half the previous year's ratio. At Candahar there was a severe outbreak, and others at Bagdad, and Jeddah, and at the Gambia, in Western Africa, a fatal case among the black troops. In 1862, when the wave would extend over the zone beyond the isoclinal 70° N., the troops in the North American and Home stations showed traces of its influence, though to a slight extent only.

On 1st January, 1859, the next wave would leave the isoclinal 53° S., and both at Mauritius and the Cape there were slight indications of cholera, which increased somewhat in 1860. In the commencement of 1861 this wave would be at the isoclinal 0°. This year there was a case of cholera among the troops in St. Helena. There was also a considerable increase in the ratios of attacks and deaths at Ceylon. In the Madras Presidency the deaths among the white troops were rather fewer than in 1860; but there was much cholera among the native population, both on the Malabar and Coromandel coasts. In 1862 the wave would pass into the zone beyond the isoclinal 30° N. There was a slight increase in the ratio of the mortality among the white troops in the Bombay Presidency; in those in Bengal the ratio was much lower than the previous year, though still high. This year there was very little cholera at Hong Kong, but at Shanghai and in Northern China a severe epidemic. The disease commenced among the troops in the field, in the neighbourhood of Shanghai, on 20th May. It spread northward, reaching Taku, near Pekin, in the middle of June, and affecting the intermediate places in its course. From Taku it spread northward into Manchuria.* The mortality among the troops at Shanghai was greatest in June, in July it diminished, it rose again in August, and ultimately ceased in November. As the advancing wave would reach Shanghai about 18th July only, the cases there in May, and from that to the northward immediately afterwards, must have arisen under the retiring wave, as was shown to be the case in America in 1849, and elsewhere at other times. The diminution in July and increase in August seem to be connected with the interval between the retiring and advancing waves, as has been shown to have been experienced in other countries on several other occasions. The following year the troops at Shanghai still suffered from cholera, though to only half the extent. The disease, however, was very severe in Japan. In 1863, also, there was considerable mortality among the troops at Thayet Myo in Burmah, in April and May. The disease was prevalent around Nuddea in Lower Bengal, and at several places in the upper provinces. The French troops at Puebla in Mexico, too, were affected with cholera this year; and there was a single fatal case among the black troops in Jamaica. In 1863 the wave would embrace the zone to the north of the isoclinal 53° N., but the disease seems not to have manifested itself to any extent, either in Europe or North America, this or the following year.

The wave next in succession would leave the isoclinal 53° S. on 1st January, 1861. This year there was little increase in the ratio among the troops at Mauritius, but a very decided aggravation of their nature, two out of three having proved fatal, and the following year there was a severe epidemic. At Maritzburg in Natal, in January or February 1861, diarrhœa with watery evacuations was prevalent; and one case occurred, presenting all the characters of epidemic cholera, with complete collapse. This information I had from Dr. Mann, who attended the patient, and who had been familiar with cholera in England. In the beginning of 1863 this wave would reach the isoclinal 0°. This year there was a slight increase in the attacks and mortality from the disease in Ceylon, and the previous ratio was maintained among the troops in the Madras Presidency.† There was likewise a fatal case among those at St. Helena. In January 1864 this wave would pass into the zone beyond the isoclinal 30° N. Cholera appeared at Calcutta, after the cyclone, in October. The disease was very prevalent at Shanghai in June, but in July the cases became milder. It also prevailed in the Philippine Islands in the course of this year, the second

* Home, in Sanitary Report for the Army for 1863, p. 356.
† For Bombay, see Note B at end.

of the wave there. I have no notice of its appearance elsewhere in this zone in 1864. On 1st January, 1865, the wave would pass the isoclinal 53° N. This year cholera seems to have been experienced more or less in India, though severely only in a few places, as in the detachment of Artillery, which was attacked on the march from Mhow in April. It had been prevalent on the Mokullah coast, to the eastward of Aden, early this year, and in May the pilgrims at Mecca were affected by it. On 12th June it appeared at Alexandria; a few days later at Cairo and Damietta. The first case at Malta occurred on 3rd July, at Ancona on 22nd, at Constantinople towards the end of that month, at Gibraltar on 19th July, at Marseilles about the same date, and as the summer advanced it spread further into Spain, Italy, and France. The first case in Paris seems to have occurred on 15th September, and by the end of that month the existence of the disease was generally known. The wave would reach Paris about 18th September in 1840, according to the map; but applying the correction of 1¼ days for each year since that epoch, it would reach it in 1865, 31 days earlier, or about 17th August, consequently the epidemic there can be fairly attributed to it. The disease was also at Balta in Podolia on 10th September, at Berditschef in Volhynia on October 13, Altenburg in Saxony in end of October, and Leipzig in beginning of November, all of which the advancing wave would reach before these dates. Some cases were reported in London in the course of the summer; and there were a few on the banks of the Itchin near Southampton, in the end of September or beginning of October; and a few about the same time at Epping near London: all which must have arisen under the retiring wave, as the advancing one in 1865 would not reach Southampton until about 12th October, and London about the 27th. There were six fatal cases at St. Petersburgh early in December, also under the retiring wave. The outbreak in the "Atalanta" steam-ship, from Havre to New York, in the latter part of October, is most likely referable to the retiring wave; but without the positions and the numbers attached each day, this cannot be made out satisfactorily. The subsequent course of this wave remains to be seen, but it is obvious from the above details that its progress so far has been similar to the others which have been examined in this paper, and that its origin cannot be attributed to the pilgrims at Mecca, as there seems to be a desire in certain quarters to do.

On 1st January, 1862, another wave would leave the isoclinal 70° S. The returns for the troops in New Zealand and the Australian Colonies are available from 1860. In that and the following year these showed no attack from cholera, but in 1862 there was a millesimal ratio of 0·4, and in 1863 one of 0·7. In New Zealand, in Australia, and Tasmania, there were none. The period of the year when these cases occurred is not given, but they show these islands are within the influence of the general cause. On 1st January, 1863, this wave would reach the isoclinal 53° S. Neither at the Cape nor Mauritius were there any attacks among the troops this year. The wave would pass the isoclinal 30° S. on 1st January, 1864, and on 6th February the advancing edge would be about lat. 4° S., on the meridian 30° E. A ship, the "Queen of the North," had embarked at Bombay, on 21st January, 272 persons, consisting of officers, time-expired men, invalids, women and children, besides her crew, numbering 27. She sailed in the afternoon of the 22nd. The weather for the first few days is not mentioned. On the 28th, 29th, and 30th January there were calms; on the 31st a good breeze. Several of the invalids and women and children had suffered from bowel complaints previous to embarkation. One woman, while under treatment for diarrhœa, was attacked, on the evening of the 24th, with purging and vomiting, with a disposition to collapse, and died the following evening; but the Medical Officer on board hesitated to denominate the case cholera. Two other cases, with collapse, but without cramps and with bilious stools, occurred on the 28th and 29th January: both recovered. The first unequivocal case of cholera, in the Surgeon's opinion, appeared on 1st February, and proved fatal the same day. The ship's position, with the state of the weather, and number of attacks and deaths each day, while the outbreak lasted were as follow:—

Date.	Lat.	Long.	Winds and Weather.		Attacked.	Died.
	° ′	° ′		°		
Feb. 1 ..	2 49 N.	77 07 E.	N. to E., good breeze	81	1	1
„ 2 ..	0 47 „	77 43 „	Ditto, light ..	81	1	..
„ 3 ..	0 43 S.	78 06 „	.. .. ..	82	..	..
„ 4 ..	1 30 „	78 21 „	Calm	84	..	..
„ 5 ..	2 05 „	78 30 „	„	85	2	..
„ 6 ..	3 0 „	79 05 „	Nearly calm ..	82	..	..
„ 7 ..	4 02 „	79 45 „	Slight breeze, heavy thunderstorms	82	..	1
„ 8 ..	5 38 „	80 36 „	Slight winds, and squally.	82	1	1
„ 9 ..	5 54 „	81 18 „	Almost calm ..	82	3	2
„ 10 ..	6 58 „	81 29 „	Westerly, light ..	82	6	4
„ 11 ..	8 19 „	81 23 „	Ditto ..	82	1	1
„ 12 ..	9 16 „	81 13 „	Light and variable	83	8	..
„ 13 ..	10 04 „	81 02 „	Slight winds at first, in evening S.E. trade	83	10	6
„ 14 ..	11 51 „	79 24 „	S. E.	83	4	3
„ 15 ..	14 03 „	77 18 „	S. E.	83	4	3
„ 16 ..	..	..	S. E.	..	..	2
„ 17 ..	..	..	S. E.	..	..	1
„ 18 ..	..	..	S. E.	..	..	..
„ 19 ..	..	..	S. E.	..	..	1

The cases on the 24th, 28th, and 29th January, present the character of simple bilious cholera, notwithstanding the absence of cramps, which, though a very frequent symptom in this disease, are now known not to be a universal one. The unexpected circumstance is thus brought out, that, while for the first ten days the attacks were of the simple form of cholera, on the eleventh the more fatal variety presented itself—slowly at first, but on the ship passing into the advancing wave, on the 7th February, it was suddenly developed into a violent epidemic. Looking at the number of attacks in the "Wasp," in 1833, and the comparatively small mortality, it seems probable the outbreak in her embraced the two forms of the disease; and the same explanation may apply to the cases in the "Apollo," from 1st to 10th July, and to those other cases of which there was a doubt as to whether they were cholera or diarrhœa. In the "Queen of the North" diarrhœa was very common, both among the passengers and crew, from about the 5th February; but I was unable to obtain the names or numbers of the persons attacked, or the dates. There was no attack of cholera from the 16th February to the 19th March, when the ship sailed from Table Bay for England, and there was no death from it after 19th February.

The "Queen of the North" was a roomy ship, of 840 tons, with a good, well-ventilated berth-deck. She had in cargo 340 tons linseed in bags, and 150 tons blood stone, with about two feet of clean granite under them, for ballast. She made very little water, and the bilge was said not to have been offensive at any time; but occasionally a disagreeable odour from the hold was perceptible. Though the decks were tight, there were openings in the sill of each side scuttle, and all along under the upper deck, communicating with the spaces between the timbers, which would permit of emanations from the hold being diffused on the troop-deck. The provisions were good, but the water, which had been obtained at Bombay, was always observed to become opaline after exposure to the air for a little. So far as I could ascertain, the cases did not occur at any particular place on the berth-deck, but were diffused over it, and the crew, who resided in the forecastle, which had no communication with the hold, though their duties required many of the men to go there, were affected with diarrhœa as well as the troops, but had no cholera.*

* These facts I obtained at Cape Town, partly from the officers of the ship partly from my own observation, after her arrival there, on 9th March, 1864.

Another case of cholera breaking out in a ship at sea occurred a few months ago, which seems to illustrate some of the points advocated in this paper. The "Renown," a fine ship, of 1,293 tons, with a crew of 52 persons, sailed from Kingston for Gibraltar, with troops on board, on 3rd August, 1865, and arrived there on the 17th; and from the information at my disposal, there does not seem to have been any bowel complaint among them during the voyage. The head-quarters 1st Battalion 9th Regiment, amounting to 16 officers, 353 men, 28 women, 65 children, embarked in this vessel at Gibraltar, on 21st August —part at 6.15 A.M., and part at 5 P.M. There were five companies, designated A, B, D, F, and K. There was a single berth-deck, extending the whole length of the vessel, which was extremely well ventilated, with side scuttles, stern lights, and shafts leading to the open air above the upper deck. The hospital, as is now the practice, occupied a part of the port side, abreast the main hatchway. The companies were berthed as follows:—On the starboard side, forward, was A, followed by F, which occupied the space abreast the main hatchway, and further aft were the band and drums. On the port side, forward, was B Company, followed by K, which occupied the space up to the hospital partition. D Company was situated in the centre of the vessel, in front of the hatchway, and between K and part of F. The women and children were in the after part of the deck.

On the morning of the 22nd August, a man of the F Company was attacked with cholera, and was immediately landed; he died on shore in a few hours. Though the disease had shown itself at Gibraltar for some time, no case had occurred in the 9th Regiment, nor in the barrack from which they came, up to the time of their leaving the station. As no fresh case occurred on board up to the evening of the 23rd August, the ship sailed for the Cape, and everything went on well for some days. On 29th July a young child had an attack of diarrhœa, from which it recovered on the 31st. On the 30th another child was attacked, which was well on 3rd September. From this time the attacks became more numerous, and, to show their relations clearly, the ship's position, state of the weather, and the attacks of diarrhœa and dysentery, and of cholera, with the deaths, each day, are here given:—

Date.	Ship's position at Noon.		Winds.		Thermometer.	Diarrhœa and Dysentery.		Cholera.	
	Latitude.	Longitude.	Direction.	Force.		Attacked.	Died.	Attacked.	Died.
	° ′	° ′			°				
Sept. 1 ..	22 1 N.	24 35 W.	N. E. ..	Light	78	..	..	..	..
„ 2 ..	19 52 „	25 38 „	„ ..	Mod.	79	..	..	..	..
„ 3 ..	17 35 „	26 48 „	„ ..	Light	80	3	..	..	..
„ 4 ..	14 51 „	27 08 „	N. N. E.	Mod.	81	..	..	..	..
„ 5 ..	12 16 „	27 16 „	S. E. ..	Light	82	..	..	2	1
„ 6 ..	11 9 „	27 2 „	E. S. E...	„	83	1	..	..	..
„ 7 ..	10 19 „	27 14 „	„ ..	„	83	..	..	..	..
„ 8 ..	8 51 „	26 12 „	W. S. W.	Mod.	81	1	..	..	..
„ 9 ..	7 41 „	24 18 „	S. W. ..	„	81	..	..	..	..
„ 10 ..	6 27 „	21 40 „	S. S. W..	Light	80	1	1	2	1
„ 11 ..	5 11 „	20 46 „	Southerly	„	81	..	..	5	5
„ 12 ..	3 51 „	25 17 „	„	„	80	3	..	1	1
„ 13 ..	2 31 „	27 5 „	S. S. E...	„	79	..	..	2	..
„ 14 ..	0 56 „	28 56 „	„	Mod.	80	2	..	..	..
„ 15 ..	1 23 S.	30 8 „	S. E. ..	„	80	5	..	..	..
„ 16 ..	4 33 „	31 11 „	„ ..	„	79	4	2	3	3
„ 17 ..	7 50 „	30 59 „	E. S. E...	„	80	1	..	..	..
„ 18 ..	10 57 „	30 50 „	„ ..	„	80	1	..	..	..
„ 19 ..	13 58 „	30 04 „	„ ..	„	78½	3	..	2	3
„ 20 ..	16 22 „	29 34 „	„ ..	Light	79	2	..	..	..

The ship arrived in Table Bay on 9th October. Subsequent to the 20th September none were attacked with bowel complaint, or cholera, and there was no death.

The provisions on board the "Renown" were all of excellent quality; a quantity of water had been taken on board at London, and some at Gibraltar, which was stowed, partly in tanks, partly in casks, and though somewhat coloured by the casks, was still considered good. There was also a distilling apparatus on board, capable of making 500 gallons of fresh water daily, and, from the appearance of cholera, water from this only was employed for cooking and drinking. The cargo consisted of a general assortment of goods for the Indian market, with iron, and shingle mixed with sand, for ballast; under and around the main hatchway there was a quantity of the latter, which, when I was on board at Algoa Bay, in November, was damp, but did not present any appearance of mud mixed with the sand. Unpleasant odours from the hold were not complained of during the voyage. After cholera appeared the people were kept as much as possible on the upper deck during the day and every means employed for ventilating the berth-deck as freely as possible, and as the weather was fine throughout, all the ventilating apertures were constantly open. But for the care on these points a good many more cases might have occurred.

It has been shown above that a cholerific wave passed from the isoclinal 53° N., on 1st January, 1865; on the 15th September, on the meridian 33° W., this wave would embrace from about lat. 36° N. to the Equator; and it will seen from the above Table that, under the latter part of this wave, the disease broke out in the "Renown" the day after loosing the N.E. trade, and on encountering the warm, close weather usual there with southerly winds. As in the case of the "Apollo," cholera ceased as the ship approached the edge of the retiring wave. On the meridian of 30° W. the advancing edge of the next wave would be about 2½° S., according to the map, on 15th September, and if 25 days be allowed for the acceleration since 1840, it may be taken at 1¼° S. in 1865, without material error; and on the "Renown" entering this, exactly as occurred with the "Apollo" about the same locality, and the "Queen of the North" in the Indian Ocean, there was a fresh outburst of the disease. It is worthy of notice, too, that the wave the "Renown" encountered in the Atlantic, south of the Equator, between the isoclinals 0° and 30° N., was the same into which the "Queen of the North" ran, about a year and a-half earlier, between the isoclinals 30° S. and 0° in the Indian Ocean.

As regards the immediate cause of the cases in the "Renown," the following facts are material. It will be remembered that a man of F Company, which was berthed alongside the main hatchway, was attacked the morning after embarkation, and sent on shore. The next cases were those of another man of the same company, and of a child, who was accommodated in the women's berth, at one side, but abreast a small scuttle which led down to the afterhold, which was occasionally opened. This child belonged to a serjeant of F Company, who, with his wife and another child, had been attacked with dysentery on 3rd September. The attacks and deaths occurred in the different companies, and among the women, children, and crew, as follow :—

	Attacked.		Died.	
	Dysentery & Diarrhœa.	Cholera.	Dysentery & Diarrhœa.	Cholera.
A Company	..	..	..	1
B "	1	1	..	..
D "	4	..	..	7*
F "	4	10*	..	2
K "	3	2	..	1
Women	3	1	..	2
Children	12	2	3	2
Crew	..	2	..	

* This includes the first case at Gibraltar.

Bearing in mind the position of the different companies, and of the women and children, in the ship, and the fact that the first case in the regiment, or ship, was in a man of F Company, which subsequently suffered most, and that the others were affected nearly in proportion to their proximity to the hatchways, it is pretty clear that emanations from the hold were instrumental in developing the disease. The crew were all berthed in the poop, or forecastle, which did not communicate with the hold; of these, the surgeon and one seaman, whose duties required them to be frequently near the hatchway, or in the hold, were the only persons attacked with cholera, both of whom died. To complete the history, it may be added, that the men sick of cholera were treated in the hospital, the females and children in the women's berth. The bodies of those who died were removed on deck at once, and buried soon after, and their bedding and clothing thrown overboard. The bedding and clothing of those who recovered were freely exposed to the air for some time before being used again.

For about ten years past I have been in the habit of noting any epidemic I found mentioned in the course of reading, and have derived a very considerable number of the details given above from this source. The authorities have been specified in but few instances, as, if all had been given, they would have occupied an inconvenient amount of space. I have to acknowledge, however, the great assistance derived from Dr. Milroys' paper on the Geographical and Chronological Distribution of Cholera, in the "British and Foreign Medical and Chirurgical Review" for October 1865, the information in which has been freely employed, and has served to fill up many blanks that would otherwise have appeared. Dr. Milroys' communications on Plague, and Yellow Fever, in previous numbers of the same periodical, were of great assistance in drawing up the paper on Fever.

IV. General Remarks.

The above details place it beyond doubt that cholera, like fever, arises under the influence of a series of pandemic waves, which proceed from south to north, the form of which is determined, and their progress defined, by lines of equal magnetic dip, all round the earth, and that the isoclinals selected to indicate the positions of the advancing edge of the febrific wave on the 1st January each year, represent those of the cholerific wave equally well. The conclusion is unavoidable that cholera epidemics, as well as those of fever, are intimately connected with terrestrial magnetism.

The first part of the cholerific wave does not reach any given zone in the same year as the febrific, but in the following one, though, as was shown in the case of fevers, a severe outbreak of cholera frequently occurs under the second year of the wave, and, with cholera, this seems even more frequent than with fever. As with fevers, too, a series of outbreaks of cholera may occur under the first year of the wave, in successive zones, within comparatively narrow limits as to longitude, while further to the east or west, they may either appear in the second year, or there may be only the milder forms, or further off no trace of the disease. In the paper on fever the idea was thrown out that the limitation might be connected with the peculiar disposition of those varying currents of electricity, which, of late years, have attracted attention, and which are commonly designated earth currents. The years 1847-48 were periods of great activity of these currents in England, while 1849 was one of almost inaction, and this state of quiescence continued apparently until 1856, when they again excited attention by their frequency and force.* There was a very severe epidemic of fever in 1847-48 in Great Britain and Ireland; in September 1848, cholera appeared in London, and soon after in various other parts of the kingdom, but was not very serious; but in 1849, when the earth currents were quiescent, it was developed into a severe epidemic. In 1852 there was a mortality of ·08 per 1,000 of population from cholera in England, which increased to ·24 in 1853, and to 1·09 in 1854. In 1855, while the disease was epidemic in the Crimea, and across the centre and south of Europe, the ratio fell to ·05, and in 1856, when the influence of this wave was to have been expected in

* Walker—Proceedings of Royal Society, vol. xi, p. 105–8.

England, and while it was still very active in Russia, south of Europe, and north of Africa, the ratio was ·04 only, coincident with the re-appearance of the earth currents in a notable manner, and, up to 1860, with these in activity cholera remained low, though it had been since at Hamburg and other places on the continent in 1859. If observations on these currents in America in 1847-48-49 were available, they would prove of great interest, as it may be remembered that the appearance of cholera there was much delayed, and, after commencing at New Orleans in December 1848, in the course of the next few months, contrary to its usual measured rate of progression, it had enveloped the northern states and Canada. These facts seem to indicate that, while earth currents favour the production of fever, they are adverse to the generation of the causes of cholera, but of course more observations are required before this can be established satisfactorily. Apart, however, from their possible connection with earth currents, the evidence from many other countries, as well as that from England, is to the effect that the conditions giving rise to the severe forms of cholera are so opposed to those which lead to fever, that the one epidemic supplants the other, occasionally abruptly, and often over a large portion of the earth's surface, each occupying its own field, though these are frequently conterminous.

It becomes evident, from a consideration of the details already given, that cholera increases in frequency from time to time, the periods of aggravation being separated by others when it is much more rarely met with, or, it may be, entirely absent. These developments of the disease take place about the same time, at points distant from each other geographically in latitude, under different waves. Thus, in 1819, it was epidemic in Mauritius, Bourbon, Ceylon, and India. In 1831, with more marked manifestations at the Cape, there was an increasing mortality in Ceylon and the Madras Presidency: the milder form was common at Malta, Gibraltar, Bermuda, and Nova Scotia, while over Europe the epidemic form was prevailing, and had reached even as far as Iceland; the following year there was a severe epidemic in Ceylon and Madras, coincident with those in Europe and America. In 1845-46 there was a considerable augmentation of the epidemic form of the disease in Ceylon and in India, and in the latter year there were indications of increased activity in the Ionian Islands, Nova Scotia, Canada, and England. In 1849, during the severe outbreak in England, North of Europe, and America, there was a considerably increased mortality in the three Indian Presidencies. In 1852 the deaths from cholera rose very much in Bengal; in 1853 they remained as high there, and the Bombay Presidency and Ceylon were affected, but to a less degree; at Mauritius there was a small ratio of attacks, while from Persia, through the south of Europe, to the northern Antilles, and south of the United States, the disease was epidemic.. In 1854 Mauritius had an epidemic, and this form likewise prevailed in Europe, the West India Islands, and the northern States of America. Cholera continued in Mauritius till 1856, when it was also very severe in Northern India, and was epidemic in Brazil, the Cape de Verde Islands, South of Europe, Russia, and Sweden. These facts show that though the causes of cholera spring into activity under the immediate operation of the pandemic wave, there is still some other influence, intermittent in its operation, which may embrace several waves at once, necessary to account for its appearance. The smaller outbreaks which present themselves beyond the points reached by the advancing edge of the wave, as at Southampton and Epping in 1865, and many others noticed in the course of this paper, are attributable to the extension of this influence. What its nature is I am unable to offer an opinion at present, but I apprehend it is terrestrial.

It has been assumed that the cholerific and febrific waves have each a two yearly period, and that they are so placed, that the first year of the cholerific coincides, in geographical position, with the second year of the febrific wave immediately preceding it. This was convenient for showing the relations and succession of the epidemics, whether of fever or cholera, in different parts of the world, to each other, but it would probably be more correct to regard a pandemic wave as having a period of two years, in the first of which there is the greater tendency to fever, and in the second to cholera, though fever may continue under the second, or cholera arise under the first, whenever the more

general causes referred to in this section are in operation, and local circumstances are favourable.

As regards the immediate exciting cause of cholera, the interesting fact mentioned by Dr. Prout appears to have been quite neglected. While engaged in investigating the weight of atmospheric air at London in 1832, he found in February, coincident with the appearance of the epidemic form there, that it suddenly became increased, and this continued while his observations lasted. This increase Dr. Prout attributed to some form of malaria, heavier than air, being diffused into the lower strata of the atmosphere. What is now called antozone answers to Dr. Prout's description in some respects; but whether the malaria he alluded to were this substance or another, can only be decided by further examination. I am not aware that any attempt was made during subsequent epidemics to confirm Dr. Prout's observation, though it is most important the question should be determined, as, if the malaria be found to exist, unless its nature, mode of production, and the localities in which it is to be met with, be ascertained, all speculations with regard to the propagation of the disease, from person to person, or from place to place, in countries where cholera is epidemic, must be partial and unsatisfactory, inasmuch as they are not based on the consideration of the whole of the causes in operation.

Postscript.

The above was written and sent from this station about a year ago. In the interval many facts with regard to the recent progress of cholera have become available, which bear out the views there set forth, and which it seems advisable to notice in connection with them.

The wave which started from the isoclinal 53° S. on the 1st January, 1861, was traced up to the end of 1865, when its advancing edge had nearly reached the isoclinal 70° N. The progress of the epidemic from Mecca, through Egypt, up to the isoclinal 53° N. had been rapid, as has been shown to have been the case in many other instances under the second year of the wave; but, in its advance beyond that line, it pursued the measured progress it always seems to do under the first year of the wave, and did not become epidemic at any place in Europe previous to the date at which the wave would reach that point. A few isolated cases were reported in England in the summer of 1865, and in October the outbreaks at Southampton and Theydon Bois in Essex, took place, and there were some cases at St. Petersburg in December; but nowhere up to, or beyond the isoclinal 70° N., was the disease then recognized as existing in the epidemic form, though it continued (but with less activity than during the summer) in southern Russia and Germany, and in France, during the whole winter. Were personal communication so efficient in propagating epidemic cholera, as many recent writers believe, it is difficult to understand how, with the enormous traffic between the north of France and England, for instance, the disease was not introduced there frequently, and did not spread extensively, at a much earlier period than the middle of the following summer.

In 1866, when the wave would pass the isoclinal 70° N., the disease after displaying greater activity at numerous places to the south, where it had previously existed, began to creep up to that line, and, on the approach of summer, became epidemic to the northward of it, affecting the British Islands, Northern Germany, St. Petersburg, Stockholm in Sweden, and Christiana and Bergen in Norway, and the United States, not only from New York and Boston to Chicago to the north of the isoclinal 70°, but embracing Galveston, New Orleans, Savannah, and other places to the south of it, as in 1832. The weather was hot at New York in the beginning of May, and choleraic diarrhœa became very prevalent there at the time, and two cases of cholera occurred in the city that month, which proved fatal. The advancing wave would reach New York about 15th April, so that the appearance of the form of diarrhœa just named, nearly coincided with its arrival.

That there was an unusual activity of the causes of cholera on the western side of the Atlantic, in the end of 1865 and beginning of 1866, is obvious from the fact that the disease in its epidemic form appeared in Guadaloupe in the end of the former year (the exact date I have not been able to ascertan) soon after it had manifested itself in the "Renown," off the Cape de Verde Islands,

about the same latitude in the eastern side of the ocean; and, after nearly disappearing early in 1866, by its breaking out again in a few months, both in Guadaloupe and Martinique. Cholera, in its epidemic form, was also said to have appeared at Guatemala, in Central America, about the commencement of April, but the evidence on this point requires confirmation.

In the early months of 1866, several ships left Liverpool with passengers, for New York, in which cholera broke out soon after sailing. The first of these, the "England," left on 23th March, and on 2nd April, while at sea, the first case proved fatal. On 28th March the wave would have enveloped the whole of Great Britain, and extended nearly as far as the Faroe Islands, and the ship, on sailing, would be under its full influence; but, from want of her latitude and longitude each day, it is impossible to show her course, or estimate her position in regard to it correctly, towards the end of the voyage. In the "Virginia," the vessel which followed the "England," in April, the disease broke out after she had been the same number of days at sea. In the "Helvetia," which left Liverpool on 2nd May, it commenced before she reached Cork, and she put back to Liverpool. Two other ships, the "Peruvian" and "Union," sailed in the course of May, and in both cholera made its appearance after being some days at sea, and caused considerable mortality before they reached New York. In the absence of the positions of these ships daily, it is impossible to show their relations to the advancing wave.

The outbreak of cholera in the "Renown," on her passage from Gibraltar to Cape Town, has already been noticed. She arrived in Table Bay on the 9th October, and was sent to Saldanah Bay, in quarantine, where she disembarked the troops immediately, and was thoroughly fumigated and whitewashed, and the bedding used by the troops on the voyage out destroyed. Towards the end of October she proceeded to Algoa Bay, where she arrived on 1st November, still in quarantine, and came to an anchor about three miles off Port Elizabeth. She received pratique on the 8th November, and on the 9th the headquarters of the 96th Regiment embarked, and she sailed for Bombay the same day. New bedding taken on board in England was served out to the men. There had been no case of cholera or bowel complaint among the crew since the troops disembarked. On 31st October, about 8 A.M., Mr. Housely who attends the troops at Port Elizabeth, was called to a case in town with vomiting and purging of watery matters, cramps in limbs, and collapse, but without the peculiar alteration of voice, or suppression of urine, usually met with in the epidemic cholera. Reaction came on in a few hours, under the use of stimulants, anodynes, external warmth, &c. The patient was a female, aged 55, employed as a monthly nurse, then residing in a house near the sea-shore. No other case of this sort occurred about that time. The men of the 96th were 19 days in Port Elizabeth before embarking, encamped in a healthy locality on a hill above the town. Some had slight diarrhœa, which is frequent among persons there for the first time, in consequence of the saline impregnation of the water in common use. From information received from Assistant-Surgeon Mitchell, the Medical Officer in charge, it appears that on 12th November, one of these, Private McDonald, had an attack of vomiting and purging, the evacuations being like rice-water, but, being seen to immediately, collapse did not ensue. This man slept on the port side, near one of the hatchways, a place very clean and well ventilated. The ship's position on the 12th November was 33° 13′ S. 27° 6′ E. There was no other case of this description during the voyage, and the people continued healthy. It is difficult to determine, from these details, whether the case of McDonald was attributable to the shore or ship; but as the previous occurrences in the "Renown" have an important bearing on the causation of cholera, it is well they should be placed on record, to complete the history of the disease on board of that ship.

Graham's Town, Feb. 13, 1867.

Note A.

In the "Medical Times" of 23rd November, 1867, Dr. Macpherson gives a detail of the deaths from cholera in the town of Bombay in each month, from February, 1851, to January 1865 inclusive, being 14 complete years. The sums of the deaths for each month are—

Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec	Total.
3,296	2,729	3,270	4,072	3,784	3,972	2,312	1,339	875	1,118	1,401	2,433	30,601

These show the lowest mortality to have occurred in September. The magnetic dip at Bombay is increasing, and the mean of the inclinations for 1857 and 1858 at the Bombay Observatory may be taken without material error, as the mean dip for the period this amounts to 19° 11′.2 or 19°.2. As the wave is supposed to move from the isoclinal 0° to 30° N. in the course of the odd year it should reach Bombay about the 20th August, and as the minimum mortality corresponds with the interval between the advancing and receding waves, the numbers given above agree very closely with the theory.

It has been stated in the body of the above paper that though outbreaks of cholera are common under the second year of the wave, yet that epidemics are more frequent in the first, so that in a series of years the mortality under the first year should extend that under the second. Dr. Macpherson's numbers bear out this distinctly, taking the first year of the wave at Bombay to commence in September of the odd years, and that of the second year with the same month in the even years. The following sums are obtained for the different months :—

Year of Wave.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Total.
1st	368	646	972	1,547	2,244	1,556	1,813	2,629	2,327	2,027	1,153	738	18,020
2nd	507	472	429	886	1,052	1,173	1,457	1,443	1,457	1,945	1,159	601	12,581

The deaths under the first year of the wave were thus three to every two under the second, almost exactly the ratio of the deaths from fever among the troops in Jamaica under the first to those under the second year of the febrific wave ; and this excess is found in every month but September and July.

Note B.

Cholera was frequent at Bombay in December 1861 and the following January, and continued up to July. From September 1862, it was less severe though still prevalent ; but it increased in the end of 1863. Dr. Macpherson's numbers for these two years, the second of a retiring wave, and first of the succeeding one respectively, are—

Year of Wave.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Total.
2nd, 1862 ...	161	272	201	269	189	50	89	161	153	161	412	240	2,358
1st, 1863 ...	178	181	176	319	622	401	302	680	837	395	371	351	4,813

showing more than double the mortality under the first year of the advancing ave in 1863–4 than under the second of the preceding one in 1862–3.

APPENDIX No. XLV.

CEREBRO-SPINAL MENINGITIS.

With a Selection of Cases by Several Medical Officers.

This is no new disease, but one which has prevailed at different times both in this country and on the Continent. Its re-appearance in 1865 in North Germany in an epidemic form, its prevalence among the recruits of the American armies, and the occurrence of several attacks among our own troops serving in Ireland and elsewhere, have given it fresh interest and importance at the present time.

The following cases have been supplied by officers of the department, and they will serve to give a good idea of the course and symptomatology of the disease, as well as of the morbid phenomena which are discovered on *post-mortem* dissection.

The disease appears to have manifested itself under one of two forms :—

1. The rapid variety, attended with purple blotches, embarrassed respiration and circulation, amounting to imperfect collapse, and followed by a state of sopor and insensibility, which speedily advances into coma.

2. The cerebro-spinal form, in which symptoms referable to irritative disease of those parts are prominent, such as retraction of the head, pain and cramps of the muscles, delirium, &c., accompanied by fever, and frequently with the effects of disordered innervation, such as herpetic eruptions, &c., about the face and body.

In reference to its varieties in point of gravity and fatality, and the absence of any, or any well-marked, anatomical lesions of the nervous system in the first form, it must be remembered that in these respects, if it be a fever depending upon a specific blood poison, it follows the law of all acute specific diseases, in that the poison may kill quickly, and be attended with no other marks than those referable to a disorganised blood, while, if the patient survive long enough, the anatomical lesions characteristic of the disease become developed, and to those secondary lesions the symptoms during life, as well as the fatal issue of any given case, may be referred.

The first case, recorded in 1867, occurred in the 52nd Regiment of Light Infantry, stationed at Richmond Barracks, Dublin. Very shortly, it was this: Private H—— was on guard at the Magazine Fort, on Feb. 24th, and came to hospital next morning. He exhibited lividity of countenance and symptoms of extreme pulmonary distress, for which no cause intrinsic to the thoracic viscera could be discovered. During his illness he suffered from symptoms of cerebral oppression, vomiting, purging, hiccough, great pain in back and head, succeeded by coma. He died on March 11th, 1867, 15 days after admission into hospital. No spots are spoken of. The *post-mortem* examination showed intense congestion of the membranes of the brain, and opacity of arachnoid in patches; the congestion most intense at the base of the brain, accompanied by lymph and traces of purulent matter about the pons and upper part of medulla oblongata.

Surgeon-Major Cogan, the medical officer in charge of the 2nd Battalion of the 2nd Regiment at Birr, Ireland, had a child under his care attacked on the 8th of March. The child had apparently been undergoing for some months a gradual deterioration of health, but was in rather better health on the day of attack. The symptoms were—vomiting, fever, pain in head, back, &c.; purple, livid spots on face, back, thighs, legs, and feet, and indications of a cerebro-spinal irritation. On the 14th, the eruption of measles appeared.

This child ultimately recovered after a very long and severe illness. The details of this case are extracted from a published report of Dr. Cogan's.

A reference to the medical returns of the 2nd Battalion of the 2nd Regiment for the week ending the 29th of March, shows one death from apoplexy. Attention has been directed to this. It appears that a private, of the age of 21, had been in the regimental hospital since the 17th of March for primary syphilis. On the 27th apoplexy supervened; death in 30 hours.

An abstract of the *post-mortem* appearances (19 hours after death) mentions—"Body rigid, with livid spots about the neck and trunk. Membranes of the brain congested; substance of the brain firm, but much congested; a small quantity of straw-coloured fluid in ventricles, and a trace of pus was found in the posterior part of each lateral ventricle." No pathological changes in other organs sufficient to account for death were discovered.

The 85th Regiment was stationed in the Royal Barracks, Dublin. The patient was a young soldier. He was admitted into hospital March 19th, under the head "encephalitis," and died of coma after three days' illness. No further history or details of *post-mortem* appearances received.

The depôt of the 83rd Regiment embarked from Dublin on the 27th of March, to join the depôt battalion at Colchester. On the 22nd a death took place at Dublin. Private W—— was sent to the General Hospital on that day "in a state of partial collapse," and he died on the 23rd, under the head "typhus fever," after an illness of from 48 to 60 hours.

The *post-mortem* appearances are described thus: Brain and lungs deeply congested, cavities of the heart filled with dark fluid blood, small intestines congested throughout, and presented livid spots in many places.

The 83rd Regiment embarked from Dublin on the 6th of April, and arrived at Gibraltar on the 13th. No medical occurrences of any importance took place during the voyage, with this one exception, viz., on the 9th of April a woman is reported to have died of "purpura," after 24 hours' illness. It is obviously possible that subsequent events in the medical history of the regiment or in the garrison of Gibraltar may render a knowledge of this event a matter of primary importance.

So far we have described cases, some of which have, and some of which have not, a distinct reference to the disease in question. Their relevancy will, however, be rendered manifest when read by the light of the subsequent events in the 2nd Battalion of the 2nd Regiment, and particularly so in reference to the prominent position assigned by the medical officer of that regiment to the influence of the diffusion of the typhus poison by the return of the men who formed part of the "Flying Column."

A private soldier of 2nd Battalion 2nd Regiment, aged 29, died on 31st March, in the Thurles Union Fever Hospital, of what was supposed to be a malignant form of typhus fever. Two cases of the same disease were admitted; one, as we have said, of a malignant type, which rapidly proved fatal (27 hours' illness). We have no skilled or educated observation on which to rely, but the orderly, who subsequently attended upon an undoubted example of the disease at Birr, remarked that one of the typhus patients at Thurles was covered with the same livid purple spots when he died that he (the orderly) saw on the patient at Birr.

The medical officer in charge of the Flying Column was unable to account for these occurrences. The whole district was, he believed, exempt from fever during March, and the men attacked had, as it happened, undergone less exposure than their comrades; moreover, these two men of the detachment of the 2nd Regiment were said to have been the first occupants of the fever ward of the civil hospital.

The Flying Column was now broken up, and the detachment marched from Thurles to Roscrea. On their arrival at Roscrea (5th April), a soldier was taken ill, and sent to the regimental hospital at Birr, where he was found to be suffering from the symptoms of typhus fever.

We now come to the commencement of the outbreak of the disease in the 2nd Battalion 2nd Regiment.

On the 13th April, at 2 a.m., a child was attacked with fever, vomiting, and purging, succeeded by dark-purple spots on the body and extremities, unconsciousness, coma, and death, in 17 hours. The father of this child had no

been out with the Flying Column, but the mother washed for the men who had formed part of that column.

The two next cases occurred on the same day—that is, on the morning of 14th of April.

A young married woman, the wife of a sergeant who had returned from the Flying Column, was seized with symptoms of the disease—fever, cerebral disturbance (incoherence), the appearance of large dark-purple spots on the skin—succeeded on the third day by great pain in the head, and serious disease of the left eye, with purulent deposit in the cornea.

A recruit was attacked in a somewhat similar manner. His skin presented some of the characteristic spots; he laboured under fever, headache, delirium, followed by the signs of cerebral oppression amounting to loss of consciousness. Obstinate constipation was a marked and exceptional symptom in this case, which ended in recovery. The mother of the above-named dead child washed for this man, and he slept in the same room with men who had been out with the Flying Column.

Dr. Ross, 92nd Highlanders, proceeded to Birr, with instructions from the major-general commanding the division to confer with the medical officer of the 2nd Battalion 2nd Regiment, and furnish a report. This report is dated Birr, April 16th. It throws but little light on the subject. Two cases of typhus fever were in the hospital—one severe, the other convalescing. Every precaution against contagion had been adopted. The position and sanitary condition of the hospital and barracks are reported as excellent in every way; the town of Birr was clean and healthy, and no disease existed among the civil population. Dr. Ross considered the disease to be a malignant form of typhus, and he, accordingly, deemed it highly contagious.

The next case reported occurred in the 52nd Regiment at Richmond Barracks, Dublin.

A young soldier was admitted on the 16th of April with symptoms of fever. He first exhibited dangerous indications at 2 A.M. the following morning. The symptoms were those of spinal irritation and cerebral oppression. A few petechial spots appeared on the thighs. Death ensued at half-past 8 A.M., 23 hours after his admission. Membranous lymph about the pons and upper part of medulla oblongata, and great congestion of membranes of the base of the brain, are mentioned in the abstract of *post-mortem* appearances. The liver was enlarged (6 lbs.) from old disease, and a considerable quantity of fluid existed in the pericardium.

Upon the afternoon of April the 17th, Cornet Lord H. B——, 9th Lancers, died of this disease. This officer was attacked at the Island Bridge Barracks, Dublin. He complained of "feeling unwell and bilious" on the morning of the 16th, but he was so much better at noon that he was anxious for food. About 10 A.M. of the 17th, however, symptoms of cerebral oppression set in; numerous small, dark, petechial spots appeared on the trunk and extremities, and he died at 1 P.M., having been insensible since half-past ten A.M. There was no *post-mortem* examination, but Dr. Stokes and other eminent medical men had no doubt about the case being an example of this disease, and referable to blood-poisoning.

A medical board, assembled by order of Lord Strathnairn, examined the barracks, &c., minutely. The regiment was reported to be very healthy; no other case had occurred. The site of the barracks was objectionable, but the board did not deem it necessary to recommend the removal of the regiment.

We now return to the 2nd Battalion 2nd Regiment.

On April 25th a case occurred in the person of a little girl, 4 years old, whose father had been with the Flying Column at Thurles. Death ensued on the 28th, at half-past 8 P.M. The duration of the disease was 77 hours, and the character of the symptoms left no doubt of the presence of an acute cerebro-spinal meningitis. The skin was covered with a purple eruption from a very early stage of the disease. No *post-mortem* examination was made.

Another child was taken ill on the night of the 29th April, but not so ill as to prevent his continuing his attendance at the regimental school on the day following. He was, however, too unwell to remain there beyond a short time. The symptoms were—first, vomiting and purging, then headache, fever, purple

spots on the body, succeeded by delirium, convulsions (quasi-tetanic in character), and death at half-past 4 on May 3rd, being 59 hours from the time of the medical officer's first visit, and 73 hours from the commencement of the sickness.

The next case occurred in the 52nd Regiment, Richmond Barracks, Dublin. A young soldier was admitted on the 30th of April. His symptoms were—purpuric spots or blotches about the lower extremities, a marked tendency to prostration, suffused conjunctivæ, cool hands and feet, and the ends of fingers and finger-nails livid and numb. No headache or symptoms referable to the cerebro-spinal centres in this case. The prostration rapidly increased, and he died at half-past 12 P.M., 16 hours after admission into hospital. The body, after death, was covered all over with purpuric patches, particularly the thighs and legs. Besides an unusual quantity of serous fluid at the base of the brain and in the spinal canal, nothing abnormal was detected in these parts. The heart was stained with mulberry-coloured spots over its surface.

The next case occurred, on May 1st, in the 85th Regiment, stationed at the Royal Barracks, Dublin. The patient was a young soldier, aged 19 years.

On the 6th of May another case of this disease occurred in the 2nd Battalion 2nd Regiment, at Birr.

On May 6th a case occurred in the 52nd Regiment, while still occupying the Richmond Barracks. The patient was a young man, 19 years of age. The attack is said to have commenced with a rigor on the morning of the 6th. He was sent to hospital, and merely complained of slight headache and pain in the limbs during the day. About half-past 6 P.M., however, symptoms of a serious nature rather suddenly set in—prostration and drowsiness, with an altered dusky hue of the countenance. A few livid patches appeared on the inferior extremities; vomiting, pain in the head, irritability of the bladder, and tonic muscular contraction, were evidences that the cerebro-spinal centres were implicated in the diseased action. This man recovered, being reported convalescent on the 24th of May.

We now come to the 48th Regiment, which occupied the same barracks as the last-named regiment, viz., the Richmond Barracks.

A man was admitted into hospital on the morning of the 11th of May, complaining of pain in the head and shivering. Towards the middle of the day livid spots began to appear, and continued to increase in number and depth of colour until his death, at 12 the same night. He was comatose for 10 hours, and death ensued in 14 hours from the time of attack. The autopsy revealed congestion of the abdominal organs generally, a similar state of the brain, some effusion of blood into the sac of the arachnoid (?), a deposit of lymph on the surface of the brain, and about a drachm of fluid in the ventricles.

On the evening of the same day (11th) another man of the 48th was admitted into hospital suffering from symptoms very closely indeed resembling those just described. No petechial spots made their appearance, however, and he recovered.

It is very noteworthy, in connection with the two last-named cases, that the men belonged to different companies, and occupied different rooms in the barracks.

Curragh Camp.—The first case that occurred at this camp was in the person of a young recruit belonging to the 69th Regiment, aged 17, who was attacked on the morning of May 24th, and brought to hospital on a stretcher in a semi-collapsed state. He was found in bed in the barrack-room in a nearly insensible condition. The eruption in this case consisted at first of red patches, which became of a dark-purple hue afterwards. After the use of stimulants he recovered consciousness, and relapsed into a state of insensibility in the course of the day, but regained consciousness on the 25th. He complained of pain in the head and extremities, and his bowels had acted very freely during the night without medicine.

Private T. D——, 48th Regiment, aged 21; service, three years; under treatment in hospital from May 14th for pneumonia, from which he was convalescent. On the morning of June 3rd he was attacked by shivering, sickness of stomach, headache, and febrile symptoms. Early on the morning of the 5th he became comatose, and died at half-past 9 P.M. on that day. Dura-

tion of disease, 56½ hours. There were no purpuric spots, but the medical officer under whose care he was—Surgeon Clarke, of the 69th Regiment—considers the case to be similar to those previously observed in Dublin, in which purpuric spots were present.

On *post-mortem* examination a large layer of recently-formed lymph was found deposited on the lower surface of the cerebellum, and extending down the spinal cord as far as the last cervical vertebra.

Private Thomas H——, 59th Regiment, aged 18; service, two months admitted under the care of Assistant-Surgeon Whittaker, 69th Regiment, on the morning of the 8th of June. Semi-comatose, eyes suffused, skin hot, respiration labouring, pulse rapid and weak; a number of dark-purple spots over hands, arms, and parts of chest and abdomen, also a few on the legs. He was slightly purged, and vomited some bilious-looking fluid. He died at 5 P.M. Duration of illness, about 12 hours.

There was no lymph effused on the brain, but there was an increase of fluid in the ventricles. The choroid plexus was of a dark-red colour, and the upper part of the cervical spinal marrow presented a thick network of bright-red vessels.

Private Samuel D——, 89th Regiment, aged 19; service, one year; admitted on the morning of June 8th, with great prostration, labouring respiration, pulse weak and rapid, and his chest, abdomen, arms, and legs covered with dark-purple spots. He died at half-past three P.M. Duration of illness, about 12 or 14 hours. Retraction of the head was present in this case.

The *post-mortem* examination showed great congestion of the membranes of the brain, particularly on the under-surface, where there was a small quantity of effused lymph. The substance of the brain was thickly studded with red spots of irregular shape and size. The ventricles contained a quantity of fluid, and the arachnoid covering of the spinal cord showed a net-work of bright-red vessels.

Corporal Wm. T——, 52nd Regiment, aged 39; service, 20 years; admitted half-past four A.M. on June 11th, with prostration, nearly to loss of pulse, sighing respiration, inability to speak or answer questions, hot skin, and an eruption of dark-purple spots over body, arms, and legs. He died at half-past six P.M. Duration of illness, 14 hours.

The upper surface of the brain was covered with effused lymph, thicker at some parts than at others; the blood-vessels were congested with thick dark blood. On the inferior surface of the brain the membranes were congested, but no lymph had been effused. The arachnoid covering of upper part of spinal cord presented a net-work of bright-red vessels. The substance of the brain was thickly studded with bright-red spots. The ventricles contained some fluid, and the choroid plexus was dark-coloured.

During life the urine was examined; it was of natural colour, sp. gr. 1010, acid reaction, and did not contain albumen. This case was treated in the same hospital and by the same medical officer—Assistant-Surgeon Whittaker, 69th Regiment—as was that of Private Thos. H——.

Case of Private P. M., 1st Battalion 21st Fusiliers, stationed at Newry, Ireland. Reported by Assistant-Surgeon Whipple, M.D.—History.—This man was always a strong healthy soldier, but of very intemperate habits. On admission he had been brought from the guard-room, where he had been confined the previous night, complaining of violent pains in the head, and of shivering. This was at 7.30 P.M. of 12th April, 1868, and at 10 o'clock I found him in the following state:—

He was lying on the left side, with the legs and thighs flexed, and constantly putting his hands first to his head and then to his thighs, as though those were the seats of pain. He was restless, and constantly shifted from side to side. He was quite insensible, and by no amount of effort could I rouse him to even a momentary state of consciousness. His breathing was rather quick and difficult, but there was no stertor.

The face pale, dry, and of a leaden hue; the eyes were not suffused, nor was there strabismus, but there was slight dilatation of both pupils, and closure of the lids; the lips were dry; the jaw tightly clenched; the fingers were constantly working; and the arms and legs were stiff, so that it was somewhat difficult to bend them.

The tongue dry and coated; the bowels not open. Vomiting came on whenever food or drink was given, but not otherwise.

The bladder was comparatively empty. The skin was moist, and above the natural temperature, but there were no maculæ nor petechiæ, nor were there any after death. The pulse was 95, regular, and, though small, was rather hard.

I gave him m. ij of cróton oil by mouth; and as this did not act in two hours I ordered a suppository of three drops (as he had just been sick), and this soon acted copiously—the fæces, which he passed in the bed, being of a most offensive odour, and very dark. The head was shaved, and cold applied.

The next morning he was still insensible, and still lay in a restless state, and still seemed to be suffering in his head. The bladder empty. All the symptoms were increased in severity. The pulse was 100, and smaller, being occasionally irregular. Tongue dry, brown, and small; sordes on the gums, &c.; nostrils choked with dark, dry mucus; the eyes unchanged.

About 2 o'clock he seemed to be more at rest when lying on his back; the insensibility more profound; the restlessness lessened; the breathing more laboured, and almost stertorous; the face paler, more leaden, and death-like; the skin getting cold, and the fingers wrinkled and pinched; the pulse hardly perceptible. From this time he sank very rapidly, and died without any change of symptoms at 4 P.M., about 21 hours after admission.

At the *post-mortem* examination, held 19 hours after death, there was one spot (of about half the size of the hand) of dark discolouration near the right elbow. There was also the usual dark *post-mortem* discolouration of the back, from the blood flowing after death to the most pendant parts, but there were no maculæ or other spots. The veins of the dura mater were much gorged, but there was no effusion of blood. There was great congestion of the brain, with effusion of turbid serum at the base. Spots of purulent matter in the meshes of the pia mater. The spinal cord was not examined. All the other organs were healthy, except the liver, which was cirrhosed.

Dr. Whipple considers these appearances were sufficient to account for death, but hardly for its occurrence so suddenly and rapidly. Indeed it seemed as though some blood poison were acting, as in cholera, of which it somewhat reminded him. There had been no case of cerebro-spinal meningitis in the town for the last quarter at least.

Abstract of the Case of Private John E——. 89th Regiment, who died July 27th, 1867. By Surgeon Reid, 89th Regiment.—This man came to hospital on the 26th instant, about 4.30 P.M., complaining of the following symptoms, pain in head and limbs, shivering, general feeling of illness and nausea; his skin was hot and dry; pulse quick and full; bowels unaffected; tongue white.

The following morning his skin was cooler, pulse 86, and a good quality. Expressed himself as better, but feeling weak, and said he had slight headache and some pains in legs and back. At 2 o'clock (27th) patient is stated to have become uneasy, moving about in bed, and to have sat up and called one of the orderlies, and immediately afterwards became confused and unconscious, unable to answer questions; he lay on his back with arms and legs rigidly extended.

On examining at 2.30, half-an-hour after the attack, I found his skin hot and dry; pulse 96 and weak; breathing, oppressed; teeth, clenched; limbs, extended and stiff. Over lower part of both legs there were a few spots of light purple colour, and over body a thinly scattered red eruption on back of head, when it was shaved there was a large purple patch. Bowels had been twice moved since morning.

As the day advanced the severity of the symptoms increased, the face became contorted, and twisted towards the left side; the left eye much everted; limbs continued extended, and back arched. No increase in the number of purple spots, and the rash which was apparent over body seemed to be disappearing. His pulse began to fail (4.30), and skin to loose its heat; had great difficulty in swallowing the smallest quantity of fluid; much subsultus tendmum. From this time forward patient's strength rapidly failed, pulse became indistinct, skin cold, breathing slower, and at 5.30 P.M. the patient died.

The room from which he came is clean and in a satisfactory condition, and

I cannot discover any fact to lead me to infer that the disease is either contagious or infectious.

Post-mortem examination 19 hours after death. On removal of calvarium, the superior longitudinal was found engorged and filled with thick dark coloured blood. On opening the dura mater, the surface of the brain appeared of a milky colour, the membrane covering it being opaque, this was most evident at the vertex. On removing the brain and examining the under surface, some inflammation of arachnoid was apparent, and the vessels of the membranes were somewhat congested. There did not appear to be any effused lymph present. The upper portion of spinal cord, 2 inches of which were removed, was in a normal condition, but the membrane covering it contained a net-work of bright red vessels. The substance of brain was firm. On cutting into it many puncta visible. The ventricles contained some fluid, but not in any quantity. Choroid plexus natural in appearance.

On opening thorax, lungs found healthy; heart, natural; valves, healthy.

The liver was enlarged but not diseased, spleen engorged.

A Case of Cerebro-Spinal Meningitis. Reported by Surgeon Baxter, 12th Lancers, Dublin.—Private H. L., 12th Lancers, strong, robust man, 26 years of age, seven and half years' service, had been absent on a debauch, from his regiment, viz., from the 27th to 30th January, 1868, reported himself sick on the morning of the 8th February. When brought to hospital stated that he felt slightly unwell for some days, although since his return he had performed his usual duties. He had accompanied the regiment, marching some miles into the country on the 7th instant, and the same night went on stable guard, the non-commissioned officer in charge noticing nothing remarkable in his appearance, nor did he make any complaint, but on returning to his barracks at reveille he did complain of being sick, and was allowed to lie down.

On admission he was in a state of partial collapse; face, pallid; circulation, weak and low; tongue, furred; bowels, constipated; complained of "sickness and pains all over." He was placed in bed, and ordered a hot foot bath. About 1 P.M. his bowels were freely opened by a purgative, which had been administered; evacuation large and extremely offensive; he was also sick, vomiting a pint and a half of thin greenish fluid. As his heart's action and pulse continued feeble, he was ordered a sinapism over cardiac region, and successive doses of sal volatile and camphor julep. 4.30 P.M., bowels again moved in bed unconsciously; 6.20 P.M. found him in a stupid half comatose condition; lividity of lips and partially so of countenance; there were also a number of livid or purpuric spots on shoulders, arms, surface of chest, and here and there on thighs; pulse absent from both wrists, heart's action, as well as the act of respiration was remarkably feeble, the latter very slow. These symptons increased, and he gradually sank and died at 7.15 P.M.

Post-mortem examination 38 hours after death. External appearances: body, well developed; muscles, hard and firm. On removing the calvarium, the membranes of the brain were found turgid with blood, and patches of lymph were observed here and there on the arachnoid. Substance of the brain remarkably firm, sections of which presented a number of bloody points; lateral ventricals contained a very small quantity of serum; choroid plexus, healthy.

Thorax.—Lungs quite free from adhesions; lower lobes permeable to air, but turgid with dark blood, amounting to a passive apoplexy.

Heart.—Normal in size; ventricles, empty; about half an ounce of serum in cavity of pericardium.

Abdomen.—Solid and hollow viscera were free from disease, presenting no abnormal appearance.

Case of Cerebro-Spinal Meningitis. Reported by Dr. Baxter, Surgeon, 12th Lancers, Dublin.—Private W. S., 12th Lancers, a strong well-built man, 24 years of age, and three and a half years' service; had been attending divine service the morning of Sunday the 16th February; had afterwards enjoyed his dinner, and eaten largely of "steamed pie," and had in the evening been on stable guard for an hour; when relieved he appeared in good health, and lay down soon after his return to the guard-room on one of the benches and went to sleep. At 10 P.M. he suddenly awoke, said he felt very cold and sick, and was shivering like a man attacked with ague, he was at once removed to the

hospital and put to bed, the feet and legs were put into hot water and kept in it for some time, the shivering ceased; and patient declared himself much better. As the man was known to be a very large eater, his ailment was attributed to an excess in diet, and an emetic administered, this brought away large quantities of undigested food. A cathartic was ordered to be given at daylight. Patient passed a good night, and appeared, when first seen, and in fact up to 10 A.M., perfectly well, only complaining of slight pain in his legs. However when the ward was visited at 10 A.M., patient appeared in a state of collapse, he was shivering like a person suffering from cold; there was a bluish appearance of the face, and innumerable dusky and livid spots were scattered over the skin of the whole body; the skin, cold and clammy; pulse, imperceptible at both wrists; heart's action, extremely weak; he vomited a large quantity of greenish matter, and passed a motion in the bed; when moved into a smaller ward he fainted, but soon recovered; mustard foot-bath was ordered with sinapism over epigastrium, cardiac region, and nape of neck; patient complained much of the pain caused by their application, and continually asked to have them removed. The skin became hot and a copious perspiration broke out over the whole body; he was perfectly conscious, answered any question, and put out his tongue when asked to do so. At 3 P.M. the scalp was shaved, and a sinapism followed by a blister applied; pain in legs complained of, flannels wrung out of mustard and water were wrapt round them, the feet were warm; small pieces of ice were given, the water of which he swallowed without any apparent difficulty; no pulse at the wrists; dusky patechiæ plentifully scattered over the whole body: the ears shrivelled and blue, as also the ends of the fingers. An enema containing turpentine and castor-oil brought away a quantity of fœtid matter. A mixture of bark, containing chlorate of potash and chloric ether, was ordered to be given. A catheter was introduced, but the bladder found to be empty. After 6 P.M. the bluish patches increased in size, and became more marked; the feet became cold. A quantity of greenish black fluid was vomited, and the bowels were moved, patient asking for the bed-pan beforehand; m. xx of turpentine, m. xl of sp. juniper, and m. xx of sp. ether nit., were added to the bark mixture, and ordered to be given every two hours. There was no pulse, but the man was perfectly conscious, and only complained of pain in the legs.

After this the man gradually sank, the extremities became cold and blue and covered as the rest of the body with a cold clammy sweat; consciousness remained unimpaired; patient answered any questions, and was able to swallow anything given. Mustard plasters were applied to the calves of the legs and soles of the feet. The lividity of the skin became more apparent, and the patient died calmly at 4.45 A.M. No wine was passed since admission into hospital.

Post-mortem appearances 56 hours after death:—

Strongly built man, good muscular development, body covered with livid spots and patches, especially on the arms and thighs, about the ankles; the whole skin was discoloured; ears, blue and shrivelled, as also the ends of the fingers; toes, white; no blueness about lips.

Brain.—Normal, firm, superficial veins turgid.

Lungs.—No adhesions, no disease or remains to it, substance turgid with black blood.

Heart.—Substance natural, large pieces of fat found on the organ and around it, these were also very plentiful between the lungs and surrounding the great vessels; superficial veins of heart filled with black blood and greatly distended by it; valves, healthy; three pieces of coagulated fibrine were found in the ventricles of the heart, one was floating in the blood, the two others were attached to the columnæ.

Other organs, including the kidneys, quite healthy.

A Case of Cerebro-Spinal Meningitis. Reported by Surgeon Reid, 89th Regiment, Dublin.—Serjeant T. M., 89th Regiment, an Irishman, 39 years of age. His medical history since 1860, shows several admissions for intermittent fever, none for syphilitic disease. He has always been a man of delicate constitution, but has not suffered any organic disease.

He was brought to hospital on the evening of the 13th February, 1868.

complaining of headache, pains and weakness in the legs and back, a feeling of coldness and nausea, and some thirst; the skin was below the natural temperature; the pulse was 67 and weak; respiration, slow and labouring; tongue, moist and foul; eyes, suffused; pupils, natural; breath, very offensive.

The bowels had been moved; the appearance of his face was that of a man in cholera; the eyes were sunken, and the features dejected and anxious looking. During the night the symptoms became more developed. He moved about uneasily in his bed, and seemed to be endeavouring to grasp things in the air, constantly trying to turn on his face. On the morning of the 14th, he was in a state of semi-coma; he answered when spoken to loudly, but seemed immediately to relapse again; the heart's action was very feeble; pulse, 64 and very weak; his hands and face had a dusky appearance, and his countenance was expressive of great depression; pupils rather contracted; the skin was cool. At 11 A.M. a large blister was applied to the head, one to back of neck, and mustard plasters were placed along the spine. A mixture containing chlorate of potash and cinchona was given with wine, and two drops of croton oil were placed on the back of the tongue. At 3 o'clock, or four hours after the application of the blister, a marked improvement had taken place; the patient was much quieter, pulse better, hands and face had to a great extent lost the dusky appearance, and he had passed water, and his bowels had been very freely acted on. This was the first time he had passed urine since he came to hospital, it was high coloured, much loaded s. g. 1010, and contained some albumen. From this time he improved rapidly, head symptoms disappeared to a great extent, before evening he took wine and beef-tea freely, and expressed himself as much better.

Notes on Cases of Fever occurring in the Hospital, 11th Depôt Battalion, Gosport, by Staff-Surgeon Cullen.—From 1st January to the middle of February only four cases of continued fever occurred in the battalion, one of which was in an anœmic soldier lately returned from India, lasting four weeks, the other three being mild cases, not more than from seven to eight days each under treatment.

Case of Private H., 59th Regiment.—On the 14th of February a young recruit, of two and a half months service, was suddenly taken ill, and brought to hospital early in the morning, suffering from an alarming train of symptoms. These were such as are described as febris perpura maligna by late writers who have witnessed similar cases.

The disease was ushered in by a marked disturbance of the gastro-enteric system, as vomiting and purging, which preceded the more severe cerebral symptoms, while petechial spots characterised the attack from the commencement.

His first appearance at hospital was that of a man semi-collapsed, with low pulse, skin bathed in cold sweat, eyes suffused, and altogether as if suffering from shock; but he rallied from this state when put to bed, and made warm and comfortable.

He complained of coldness in the feet, his legs from the knees down being a deep purple. Diarrhœa persisted during the day, but was not excessive, and the purple blotches continued to make their appearance in increased numbers, but there was no apprehension of a fatal issue till less than three hours before his death, when rapid effusion on the brain appeared suddenly to have occurred, causing stertorous breathing, perfect insensibility, and failure of heart's action, resulting in speedy death.

The *post-mortem* appearances in his case showed that a rapidly fatal form of cerebro-spinal meningitis had occurred (purulent inflammation of the meninges), though blood poisoning may have operated as well in so speedily extinguishing the vital functions.

Case of Private S., 59th Regiment.—The second case, returned as febris continued, a young recruit of two months' service, admitted to the Detention Ward on the morning of the 15th February, and sent to hospital the same day, presented symptoms of headache, flushed face, and distressed respiration, with low and intermittent pulse, and pain in left side. Headache was severe, and pupils were dilated, and cerebral uneasiness was a prominent symptom from the first.

Counter-irritation to the head by blistering, leeches to the temples, and

rapid mercurialisation was the mode of treatment pursued, and beef tea was given at the same time for support.

In his case convalescence was quite established on the sixth day; the more severe symptoms (which, however, did never more than threaten meningitis) having disappeared on the third day.

Case of Private B., 86th Regiment.—The third case, returned as febris continued (with symptoms of cerebro-spinal meningitis), a young recruit, of three months' service, was out at the butts on the morning of his attack, the 15th, though ailing the previous evening.

He went to the Detention Ward in barracks at two P.M., and was soon after carried to hospital complaining of malaise, gastro-enteric disturbance, chiefly constant vomiting of green matter, and with great prostration of the nervous system, amounting to imperfect collapse, attended with weak intermittent pulse, cold skin, wandering delirium, restlessness, body and limbs drawn together in spastic contraction, head retracted, pupils dilated, face flushed, and the intellect in a state of torpor. He had traces of blotches on the skin on the second and third day, but very imperfectly exhibited. He was early treated by counter-irritation to head, and rapidly put under the influence of calomel combined with quinine, and at the same time had support by beef tea.

The cerebral symptoms, as noisy delirium, constant restlessness, calling out and shouting, retracted head, dilated pupils, flushed face, continued till the eighth day, since which date headache of an intermittent character, deafness, and retraction of head with wakefulness, have been the more prominent symptoms.

A mild mercurial action is still kept up, and chlorate of potash has been given in the latter part of the treatment, with a moderate amount of support.

His present appearance is that of a man approaching the period of convalescence.

Private W., 86th Regiment.—The fourth case, returned as febris continued, (with symptoms of cerebro-spinal miningitis), a young recruit, of five months service, was admitted to hospital on the morning of the 16th February, complaining of malaise and gastro-enteric disturbance, as frequent purging and vomiting of green-coloured fluid, followed in the afternoon by accession of febrile state, attended with severe headache, suffusion of eyes, &c.

The following day the febrile state continued, with great irritability of stomach, and in the evening of the 17th head symptoms made their appearance, as exhibited by a half dosing torpid state, with dilated pupils, sighing moaning respiration, flushed face, intense headache, &c., followed towards midnight by noisy delirium.

For this he was treated by leeching the temples, blister to nape, and an antimonial saline mixture, preceded by a dose of calomel.

From the 3rd to the 6th day, symptoms were dilated pupils, pains in joints, cerebral restlessness, noisy delirium, moaning and sighing respiration, eyes congested, head hot, &c.

During this period mercurialisation was induced by mercury with chalk in combination with James' powder; and as the pulse was generally low, carbonate of ammonia was exhibited as well, and support of beef tea and arrowroot.

The action of the bowels was very free from the mercurial, and had to be checked by bismuth and cretaceous preparations. He had an extremely dirty tongue throughout; the head was kept retracted, and he complained much of intermittent headache, but the worst symptoms had abated by the seventh day.

Chlorate of potash has been given in the latter part of the treatment.

Up to the present time symptoms remaining are chiefly retraction of head, intermittent headache, and disturbed sleep. A mild mercurial action has been kept up, and he appears to be gradually approaching convalescence.

Private H., 86th Regiment, and *Private N., 59th.*—Two cases of continued fever of a simple type were admitted on the 16th February. One was seven days under treatment, the other has had his stay prolonged by a vesicular eruption like herpes on both feet over the instep. These were treated by a mercurial purgative on admission, followed by saline and diaphoretic remedies, and have presented no unusual features.

Private H., 61*st Regiment*, and *Private C.*, 2*nd Battalion*, 12*th Regiment*.—One case was admitted on the 18th and discharged on the 24th, and another was admitted on the 19th, and discharged on the 22nd, neither requiring remark.

Private K., 108*th Regiment*, *Private R.*, 61*st*, and *Private D.*, 2*nd Battalion*, 12*th Regiment*.—Three cases were admitted on the 23rd, prominent symptoms in all were severe headache, heat of skin, and pains in back and limbs. None had any gastro-enteric disturbance. They were all treated on admission with calomel and James' powder, of each five grains, followed by saline mixture, and later an alteration was given and diaphoretic mixture. Being simple cases, the fever having nearly disappeared on the third day, they do not require remark.

Private C., 86*th Regiment*.—One case was admitted on the 24th, coming to hospital from the detention ward in the evening. On admission he was drowsy, head hot, tongue dry, pulse 100; symptoms were preceded by severe shivering. He was treated by a blister to the head, and a dose of mercury with chalk and James' powder, followed by small doses of calomel, and up to the present time appears going on well.

It has been suggested to the writer that it would be well to remark in what particulars the cases of fever under review have resembled the epidemic of cerebro-spinal meningitis in Ireland.

Two types have there been noted by various writers, one in which the disease has quickly extinguished life, as if by the action of a blood poison; the other and milder form, in which more gradual symptoms are developed of inflammation of the cerebro-spinal system, as shown by retraction of the head, spastic contraction of the muscles, delirium, hyperæsthesia of the surface, &c.; a sudden seizure with gastro-enteric functional disturbance being common in many instances of both types.

In the first case here noted (Private H.'s) the eruption of livid purple spots, the symptoms of nervous prostration remarked from the beginning, ushered in by vomiting and purging, the sudden accession, after a few hours illness, of symptoms which speedily terminated in coma and death, with the *post-mortem* appearances of pus deposited on the membranes of the brain, and upper part of cord correspond in all essential particulars with the graver type of the disease.

In the third and fourth cases (Private B.'s and W.'s) the symptoms though modified, presented many features resembling those of the second type. The petechial spots on the skin were absent or doubtful, but there was the severe gastro-enteric disturbance, chiefly vomiting, prominent in the commencement of the attack, quickly followed by unmistakeable signs of cerebro-spinal irritation. Of these delirium, headache, dilated pupils, retraction of the head, and pains of the muscular system generally were the most noteworthy, while minor points of resemblance were to be remarked in the herpetic affection of the lips, remissions of the febrile state, intermittent headache, and rheumatic-like pains of joints.

The remaining cases were those of simple fever, requiring no comment. S.'s and C.'s, however, threatened meningitis, but appear to have aborted.

These rough notes would be incomplete without some remarks on the probable cause of the fever, and the solution of this is probably to be found in a combination of various causes.

And first, *out* of barracks. Gosport is by no means a clean town, but contains many nuisances, which would be likely to prove prejudicial to young lads exposing themselves to their influence, especially when in a state of depression after excesses.

The town is imperfectly drained; there are numerous courts not kept particularly clean, and there are other more patent nuisances to be met with.

One of the worst is a drain from the town, which discharges itself by an outlet beyond the moat on the sand, near Haslar Bridge, and produces much offensive odour at low tide in its vicinity, especially along the road leading from the town to the bridge, which is the route to the hospital.

Within the barracks, however, there are various causes operating more directly on the health of the inmates, and the three most important facts appear to be (1) that only recruits have been attacked; (2) that all the severe

cases have come from one locality; and (3) that there was a choked-up gutter and drain in the area, near which the disease made its appearance.

The Gosport Barracks, built as they are with the ground floor sunk about 7 feet below the surface, and the rooms opening on a long narrow excavated area, overhung by a verandah, and terminating at either end in latrines, offer unusual facilities for the diffusion of foul air through the rooms, should any such exist, which can hardly fail to be the case from the number of men constantly using the latrines. Foul air once entering the area must find its way into the rooms and passages, from the want of cross draughts and special ventilation to carry it off.

The rooms, containing 25 beds, allow only 550 cubic feet per bed, and as there is no special roof ventilation, the impure air in the rooms below does not readily escape, finding its way into the area instead of being carried clear of it.

A number of young recruits sleeping in ill-ventilated rooms, their beds too closely packed, themselves seldom or never properly washed from the total want of proper bathing accommodation, urine tubs brought in at night to add an additional impurity to the close air, the passages outside the dormitories always damp from being utilised as lavatories (their sole accommodation a ledge with a few hand basins and taps), the area outside liable to be contaminated by sewage air creeping up from the latrines; these combined present aids to the propagation of disease among the inmates of a crowded barracks. If, in addition, gutters get choked, and drains filled, so that decaying animal matters and wash remain stationary for even a short time, further cause of mischief arises. In the present instance, on a close inspection of each room and passage in the barracks immediately after the occurrence of the first case of fever, a choked-up open gutter was found in the area not far from the room in which the man was attacked.

On its being immediately reported and examined, it was found to arise from a defect in the drain below, and this has had to be opened and cleaned along the whole length of the area, being completely blocked up by an accumulation of a tarry-like concrete within. Beyond this no particular fault has been hitherto discovered over and above what has been long common to the barracks from defects of construction.

The only safeguard in their present condition would appear to be to reduce the number of occupants, especially in the sunk floor; and from Gosport having a number of outlying forts in its immediate vicinity available for immediate occupation, there should be no difficulty in proportioning the disposition of the battalion to the requirements of health.

The sanitary representations made, bearing on this outbreak of fever, are the following:—

1. That the windows in the barrack-rooms did not appear to be kept sufficiently open. (This has been attended to.)

2. That a choked-up gutter in the area required repairs and immediate attention. (This was immediately put in hand the same day, February 15.)

3. That the urine tubs required re-tarring. (This has been attended to.)

4. That a constant attention be paid to cleanliness and ventilation by all officers visiting the barracks. (This has been attended to.)

5. That the bedding of fever cases should be sent to hospital for fumigation. (This has been attended to.)

6. That airing of bedding be practised daily in fine weather. (This has been attended to.)

7. That, till gutters and drains be in working order, carbolic acid disinfecting solution be used daily. (This has been attended to.)

8. That the floors be not washed out, but dry scrubbed for the present. (This has been attended to.)

9. On February 16th and again February 24th, the necessity of removing men from the barracks to the forts was pointed out, on the ground of overcrowding, and partly of clearing the area. On the last occasion 300 men were recommended to be removed. This recommendation was submitted to the Principal Medical Officer, who, after investigation, has decided in favour of 150 men proceeding to the forts.

10. In addition to the above points, the rooms in which fever cases occurred

have been whitewashed. The sick from fever treated apart from the other cases in a special ward, and their bedding fumigated. The water supply, as far as practicable, tested; and every care taken that cases reporting sick should be sent to hospital early.

Case of Private W. J. S. 6th Dragoon Guards, Dublin. By Surgeon-Major Gilborne.—This was a healthy English recruit, age 19, just joined. He had been a clerk in London. He reported himself sick on the morning of the 22nd April, 1868, complaining of sorethroat and slight headache. On examination his tonsils were found to be swollen, with some redness of the fauces. His pulse was quick, bowels confined, and other symptoms of slight pyrexia present; hot skin, &c. His bowels were opened by medicine, but the other symptoms remained the same until afternoon.

At 4 P.M. he complained of increasing headache, and coldness of the feet, on examining which several black spots were observed on the surface of toes. After a short time they extended over the feet and up the legs.

6 P.M.—Spots increased in size, and several appeared on the ears and face; those on the lobes of the ears were like bullæ or blots of serum. Pulse became weaker, and patient became unconscious.

Immediately after a dose of medicine he vomited a brownish fluid without effort, and at the same time passed a liquid motion in the bed.

7 P.M.—Became restless and slightly delirious. His head was shaved and blistered, and vesicating collodion applied to the neck.

April 23, 2 P.M.—Became restless, and soon afterwards very delirious. A state of collapse succeeded, from which he never rallied, but died at 6 A.M. of the same day.

Urine drawn off, specific gravity 1010, albuminous and acid.

Post-mortem examination 28 hours after death. External appearances of the body:—Much discoloured; feet and legs of a dark livid blue colour; several dark spots on the face and body; the ears also much discoloured. On removing the calvarium the vessels on the inner surface of the brain appeared large and congested; on the upper surface of the brain, and on either side of the fissure dividing the hemispheres, the membranes were found to be slightly opaque, and a small deposit of lymph was detected. On cutting into the substance of the brain, nothing abnominal could be detected; no congestion of the vessels or effusion into the ventricles. The spinal-cord was examined, but no abnormal appearance or trace of disease could be discovered. No disease in the viscera of any of the other organs of the body was discovered.

Abstracts of Cases of Fever (Cerebro-Spinal Meningitis); 12th Depôt Battalion. By Staff Surgeon Sinclair.—Private W. A., 75th Regiment, age 19 years, a recruit of 14 days' service, of strong, healthy appearance, was brought to hospital on the evening of 4th March, 1868, complaining of pains in the legs and back. On the following morning he presented symptoms of severe continued fever. He appeared dull and listless; the pupils were natural; skin hot and dry; pulse accellerated, soft; tongue foul; bowels had been well moved; no vomiting or trace of eruption.

In the evening, 5.30 P.M., the fever continued unabated; he did not answer when spoken to, but opened his eyes and appeared to understand what was said. The pupils acted naturally; bowels had been moved; urine clear, &c. Hair ordered to be cut close, and cold continuously applied to head; sinapisms to nape of neck, &c. About an hour afterwards he was seized suddenly with a convulsive fit, and died in the course of ten minutes.

Post-Mortem Appearances:—

Head.—Membranes highly vascular; entire substance of brain much congested, but especially at the base; puncta cruenta very numerous; veins gorged. About half an ounce of serum was found at the base, and there was slight effusion into both lateral ventricles.

Thorax—Heart.—Fibrinous clots in both ventricles; valves, &c., healthy.

Lungs.—Crepitant and healthy.

Abdomen.—Liver enlarged and congested; spleen much congested; stomach congested at pyloric end (mucous coat).

Private A. B., 75th Regiment, age 30, service 10 years, of intemperate habits; admitted on 6th March, complaining of severe headache, pains in the back and limbs, vomiting and thirst. His skin was hot and dry; tongue

rather dry in the centre; pulse 94, compressible. In the evening he expressed himself as feeling better. He was perfectly conscious. Early next morning he had a slight convulsive fit, and when seen, shortly afterwards, he was in a semi-unconscious state; would not answer questions; was very restless, throwing his arms about, and putting the hands to the head, and occasionally moaning. The eyes were fixed, and intolerant of light; pupils rather contracted; skin hot and dry; pulse 110, compressible; bowels had been once moved. In the course of the forenoon he had another fit of an epileptic character.

In the evening he was quieter, and moaned less. Skin and pulse the same; bowels had been twice moved by medicine. He passed a tolerably quiet night. On the morning of the 8th he was semi-comatose, and evidently much weaker. The jactitation continued at intervals; eyeballs staring, slightly injected; pupils more dilated, sluggish; much less heat of skin; pulse very small and feeble, 132; breathing hurried, but not stertorous; hands congested; feet rather cold; tongue seen to be coated with a white fur; fæces and urine passed involuntarily; no accumulation in bladder. Towards evening he became much weaker; breathing more hurried, and died at 8 P.M., after a slight convulsion.

Post-Mortem Appearances:—

Body.—The back, legs, and arms were covered with large purple discolourations, which appeared shortly after death.

Head.—Membranes of brain and upper part of spinal cord highly congested. Coagulated lymph effused between membranes and surface of brain. Vessels gorged with blood; there was rather more than an ounce of serum at the base of the brain, and about a drachm in each lateral ventricle. Substance of cerebrum (cerebellum) medulla oblongata, and upper portion of spinal cord softened, and the bloody points very large and numerous.

Thorax.—Heart rather enlarged, and fatty; otherwise healthy.

Lungs.—Healthy.

Abdomen.—Liver highly congested, and presented the nutmeg appearance in a well marked degree.

Spleen.—Natural.

Kidneys.—Congested.

Private B. G., 75th Regiment, 18 years of age, 7 months' service; a delicate lad, admitted on 8th March, 1868, with the following symptoms:—Severe headache, pains in the small of the back and limbs, nausea and general malaise; hot, dry skin; pulse 115, weak; foul tongue, &c.; small crepitation was audible at base of left lung posteriorly. These symptoms were preceded by rigors and vomiting. On the 9th he was not so feverish, but complained of intense pain all over the head, and in the legs, and the right knee was swollen and painful; he had a dull, heavy look, and could not bear the light; suffered much from thirst, and almost constant vomiting; pulse, very weak; a number of small purpuric spots, persistent on pressure, had appeared on the chest and legs. In the evening the skin was moist, tongue inclined to dryness, pulse rather better; no delirium. On the 11th he was rather better, having passed a good night; the pulse had improved, and the vomiting ceased; the intolerance of light continued, and he still complained of acute pain in the head, knee, and muscles of thighs and calves. He was rather deaf. He continued much the same up to the 15th, when the left eye was attacked with inflammation, both the cornea and iris being implicated. He had become quite deaf, and was very weak and attenuated. During the next few days he improved, suffered less pain, and the inflammation of the eye began to subside; the deafness continued. On the 29th he was very restless, complained of increased pain in the head, back, and limbs, and the nausea and vomiting returned. He continued worse for the next two or three days, became weaker and more emaciated, with a tendency to bed-sores. During the first week in April he began slowly to improve, the pains gradually subsided, the vomiting ceased, and he lost the dull, heavy expression. Since then his progress towards recovery has been very slow, but steady; he is now gaining flesh and strength, his appetite is good, and he does not complain of any pain or uneasiness in the head. The inflammation of the eye has quite subsided, but the deafness continues.

Private C. V., 75th Regiment, age 18 years, a slight delicate lad of 8 months service, was detained on 12th March complaining of headache. In the evening he was attacked with vomiting, and on the morning of the 13th he was very hot and feverish, although the countenance was pale. Conjunctivæ slightly injected. Complained of severe headache, intolerance of light, urgent thirst, &c. The pulse was 122, bounding; tongue coated with a brownish fur, and somewhat dry; bowels had been opened by medicine ordered on the previous day; the vomiting had ceased. In the evening he felt his head a good deal easier; the skin was acting slightly; pulse 104; lateritious sediment in urine. On the 14th he still complained of pain in the head, as well as in the shoulders, back, and legs; his skin was cool; pulse 84; had perspired freely during the night; was very restless, and had not slept; tongue moist; urine the same. Continue treatment. On the 16th an herpetic eruption appeared on the chin and about the lips; the pulse had fallen to 78, but he still complained much of pain in the head and back of neck. On the 18th he had some vomiting; the skin was commencing to desquamate; urine high-coloured, no sediment. On the evening of the 19th he had a return of fever, with vomiting; increased pain in the head, chiefly at the back part, and in the small of the back. On the 21st the fever had abated; there was less pain in the head, but he suffered much from giddiness. Was progressing favourably up to the 26th, when he had increased pain in head and legs; flushed face; hot skin; pulse 120; dry tongue, &c. On the 27th the fever was less, but he was greatly prostrated, and the pain in head, &c., was acute. On the 28th he was still weaker and more depressed, and there were some pain and tenderness down the spine. On the 29th pain and stiffness of the lower jaw were complained of, but he was not so depressed. From this date he gradually improved, and after a very protracted convalescence was discharged well on the 30th April.

Private G. C., 75th Regiment, age 24 years, service one month, admitted on 27th March with the following symptoms:—Intense pain in head, muscles of thighs and calves; flushed face; intolerance of light; skin very hot and dry; pulse 130, compressible; tongue very foul; had vomited once a quantity of dark-green bilious matter; bowels confined. His illness commenced the previous day with rigors, nausea, &c. In the evening he had less pain in the head, but acute pain in the legs; the fever continued; had vomited after the administration of an emetic; bowels not opened. On the 28th he was rather better; complained of pain chiefly in the left calf, which was swollen. A number of irregular-shaped purpuric spots had appeared on legs and arms, and a few on the trunk; they were persistent, painful to the touch, and caused a pricking sensation. Had perspired freely; tongue white; bowels slightly moved by medicine; urine high-coloured, and rather scanty; pulse 96; complained of a dull weight across the vertex. On the 29th he was free from fever, but very weak; pulse 78, irregularly intermittent; some pain and tenderness down the spine; spots the same; bowels well moved by R. Ft. haust: quater indies sumend; strong ammonia liniment to be rubbed over spine. On the 30th the left knee was very painful and much swollen; he had a dull, heavy feeling in the head; spots less distinct; an herpetic eruption had appeared about lips and nose; urine loaded with lithates; pulse better. Ond 2nd April the spots had almost disappeared; in other respects he was much the same. On the afternoon of the 4th he had a re-accession of fever, which subsided on the following day. On the 7th he was much improved; the feeling of weight in the head was gone; pain and swelling of knee less; tongue cleaning; urine clear, &c. Since then he has been progressing favourably, and is now convalescent.

Position of the Huts from which the Patients were removed.—The first case (Private A.) occurred in No. 16, and the remainder in No. 12 A range. Both of these are in the front line of huts, the first being the ninth and the latter the seventh from the eastern end of the range, which is situated on the southern side of the camp.

Insanitary Defects.—As nothing could be discovered in the interior of the huts, portions of the flooring were taken up, when the ground underneath was found to be damp, especially on the western or weather side. The ventilation beneath the floors was found to be defective, some of the apertures having been partly built up, while on one side of No. 16 there were no openings at all. The

foundations of the huts were also partly concealed by shingle added at different times, with a view to keeping the ground between the huts dry.

The remedies applied were the removal of the shingle, and the provision of thorough ventilation beneath the floors. No. 12 hut being in the worst condition, the men were removed from it until the ground was quite dry, and lime had been spread over it. It was then thoroughly fumigated. A few days after its re-occupation, a fresh case occurred, when I recommended its being vacated and left empty. This was carried out, and since then, 27th March, no fresh cases of the disease have presented themselves.

Abstract of the Case of Cerebro-Spinal Meningitis, Private F. W., 6th Dragoon Guards.—May 18, 1868, Vesper, 9 P.M.—An English labourer, a delicate young soldier of 19 years, service 1 year, 5 months, brought to hospital at 9 P.M. on Monday evening (May 18th), was on stable guard and fell down complaining of weakness and chill, pulse quick, skin hot and dry, thirst, &c.; no headache. Had acetate of ammonia mixture, tea, &c. Felt much better after being placed in bed; slept some, and skin became moist, and stated he felt better.

19*th*, 9 A.M.—Bowels open, slept some during the night, but became restless this morning; pulse small, weak, and quick; skin cool; stated he felt better, and no headache whatever.

12 NOON.—Complains of weakness, and his throat being sore; had some weak brandy and water, after which he felt much better.

4 P.M.—Remained much the same state until 4 P.M., when he had a severe and violent fit, resembling a tetanic or epileptic fit, face became very flushed, pulse quick, and very weak; surface of body warm; worked his arms and legs, requiring several men to hold him. Passed urine under him. Head was shaved, and a large blister covered with vesicating collodion immediately placed over the centre surface, and down the neck. Five grains of calomel on back of tongue.

6 P.M.—Became more quiet and much exhausted; pulse at wrists very weak; quite unconscious; had some brandy and water. Morbid sensibility of the whole cutaneous surface; feet quite warm, and perspiration on body. No trace of any dark spot or discolouration can be detected. Sinapism over heart. Mustard fomentation to legs, &c.

9 P.M.—Blister on head and neck have acted well; is very restless; has the greatest difficulty in swallowing. No return of fits, &c. Extract of Belladonna rubbed down the spine; very low and weak. Brandy and water, &c.

11 P.M.—Has remained in the same state quite unconscious; pulse hardly perceptible; passed urine in the bed; had no return of fit or violence; surface of body and feet quite warm and moist; blistered surface of head, and neck discharging freely. Cannot swallow; no spots or discolouration on any part of his body or extremities.

May 21*th*, 6 A.M.—Remained in much the same state during the night, and at 6 o'clock this morning had several weak spasmodic fits, followed by exhaustion. Sunk gradually, and died at 9 A.M.

This man had been only four days discharged from hospital, having been for 17 days under treatment for a suppurating abscess in the nates.

Post-mortem examination 26 hours after death.

External appearance of the body emaciated, dark spots on the body and extremities since death.

Head, &c.—On removing the calvaria, the membranes were found highly congested, and sinuses gorged with blood, opacity of the membrane on surface of the brain, and also a small quantity of pus detected along the margin of the central fissure (dividing the hemispheres) at either side. The substance of the brain was found highly vascular, and some clear fluid in the ventricles. The membranes of the upper part of the spinal column were congested, but no trace of disease.

Thorax.—Adhesions of pleura of the left side, both lungs healthy.

Heart, &c.—Heart large, but healthy, and a few ounces of straw-coloured serium in the pericardium.

Abdomen, &c.—Liver healthy.

Spleen and *kidneys* healthy, and no trace of disease could be detected in any other organ.

There was *no* urine in the bladder for analysis.

APPENDIX No. XLVI.

REPORT ON THE MALARIAL EPIDEMIC FEVER OF MAURITIUS OF 1866–67,

(With Plans of Port Louis and Flat Island, and a Map of Mauritius, shaded to show the Distribution of the Fever Districts.)

By Surgeon-Major JOHN SMALL and Assistant-Surgeon W. H. T. POWER, B.A., 2nd Battalion 13th Light Infantry.

THE small island of Mauritius, the sufferer from the severe epidemic of malarial fever during the hot season of 1866–67, is apparently so favourably situated that one would hardly expect to meet with the sudden appearance in an epidemic form of a genuine malarial fever, which had hitherto occurred only to a small extent in it, and had, up to the end of 1866, been almost entirely confined to emigrants from India, a race who had emigrated from a malarious country, and who, consequently, had a constitution previously modified by malaria, and especially, though not exclusively, those arriving from the Bombay Presidency: hence it will be necessary to give a somewhat detailed account of the general physical features of the island, in order to endeavour to show how the malarial poison was produced. For this purpose we have deemed it necessary to divide the subject under the following heads :—

I. Physical features and meteorology of Mauritius, with details of the various districts, especially those in which military stations existed.
II. Comparison between the fever and non-fever districts.
III. A history of the battalion in relation to the fever to the end of the year 1867.
IV. A general account of the fever, its symptoms, pathology, and treatment.
V. (As Appendix.) On a peculiar form of dysentery, which attacked the battalion in April 1867, when at Flat Island; also a few remarks on "enteric fever," prevalent during the epidemic in Port Louis.

I. PHYSICAL FEATURES, METEOROLOGY, &c.

Mauritius is situated in the Indian Ocean, its greatest length 40 miles, and 30 miles its greatest width; its area is 432,680 acres, or about 680 square miles. Volcanic in origin, it is made up of lofty rugged mountains with deep fertile valleys, and long slopes of varying incline running from the centre towards the sea. Its central part a high table-land, while a small portion of flat, and in many places sandy, soil, is found along its shore, extending into its greatest area towards the northern part of the island. The general nature of the soil, however, is alluvial, formed by the detritus of the volcanic rocks. It is usually of no great depth, but of great fertility; once clothed by forests, with an undergrowth so dense as to be almost impassable, the only remains of them now to be found are about the summits of the hills in the upper lands of the districts, the forests having been levelled for the purposes of sugar planting and as fuel supply for its enormous population. The island is nearly entirely surrounded by a coral reef.

Geology.—It presents the same general features as most other volcanic islands—viz., a central and elevated plateau, representing the original crater, which, by its eruptions, has formed the island, surrounded in part by a range of hills, the remains of the original crater wall, with various ridges running from them, and slopes of basalt (once streams of lava which flowed from the original

and minor craters at varying slopes to the sea). This original crater and its wall have been more or less altered by varying elevations and depressions, accompanying subsequent volcanic eruptions caused by movements from time to time of the same seismic force, which originally elevated the crater from the sea. A volcano still active exists in the neighbouring island of Reunion, 120 miles distant from Mauritius. The great mass of the island is formed of basalt, tuffaceous rock and lava, and the soil formed by their wear and tear in many parts is a stiff dark clay, but principally the soil is light and porous, more or less red in colour from the presence of iron. All over the soil are scattered in vast profusion loose blocks of basalt of all dimensions. Along a portion of the coast the remains of an old coral reef (now dry land) exists, and close to the sea there are portions of land made up of coral and marine shells, and in a few places a soil of friable limestone, containing land shells, is met with. Several of the small islands off the coast are composed of a portion of old coral reef as a nucleus, round, and on which, coral débris, &c., have collected.

Vegetation.—The whole of the arable portion of the island is nearly exclusively devoted to the culture of the sugar-cane, of the forests with which formerly the island was clothed, now but little remains, and even this small portion is gradually disappearing to make way for the sugar plant. In many parts along the seaboard, where the sandy nature of the soil precludes any other cultivation, belts of the "filao," a species of fir from Madagascar, have been planted with much success, but not to an extent sufficient apparently to exert any marked influence on temperature or rainfall. In the cool upper lands, and in many parts of the coast where irrigation is obtainable, all kinds of vegetables are cultivated with success, as are likewise fruit trees everywhere, and fields of maize, rice, &c., are also not infrequent.

Rivers.—There are many rivers which always flow, but the amount of running water in them is steadily decreasing, owing to the continued destruction of the forests in the high lands, and denuding the smaller hills of their wood. To intertropical countries like Mauritius forests are indispensible, as by their absence the country is exposed either to droughts or to inundation. As the trees placed by nature to prevent, or at all events to modify, such evils are now being indiscriminately destroyed, and none planted to replace them, the rain water, therefore, instead of being sheltered and contained in the soil at once runs off, carrying with it much vegetable and other matter, which is deposited along the banks of the rivers and other watercourses, and on the low-lying lands. The land in many parts from its clayey and impervious nature retains much water on its surface, the greater portion of which disappears by evaporation. Contrasting greatly with countries like England, where such immense natural reservoirs of water are found underground, from the rain water percolating through some porous rock till it meets with a comparative impervious one. At the same time there are wells in Mauritius, many sunk in sandy soil. In them the water is hard, being impregnated with lime salts. In several places a sort of subterranean river has been reached, and there the water found is pure and excellent. There are also extensive collections of water which have passed into some of the numerous long caverns, which are usually found in volcanic countries. It must be said, however, that even should the destruction of the forests continue, the quantity of rainfall must not necessarily decrease, as it is yet to be proved that trees influence to any great extent the fall of rain. Doubtless, forests have some influence upon the electrical condition of the atmosphere, but it would be difficult to determine the amount, and a small island as Mauritius, far from any continent or large mass of land, and surrounded by the sea, must, under the sun's influence draw a continual and large amount of humidity from the ocean; and as all the winds must thus be highly charged with it, much rain will be deposited in passing the higher and colder parts of the island. The rivers on the windward side are purer than those of the leeward; they are also more numerous and of larger volume. The impure condition of the leeward rivers is, in all probability, caused by their passing through, and draining districts more highly cultivated and populous. Before the cultivation of the sugar-cane was so general and all-absorbing, and the rural population less dense than it now is, the rivers, besides being larger in volume, were likewise less impure, as all the filth and

surplus drainage of the then small population was readily carried off without giving great impurity to the water; but at the present time from the great increase of sugar establishments, distilleries, &c., and the consequent enormous increase of men, mules, and cattle necessary to work them, the amount of impurity continually deposited in and around large estates and Indian villages, is very great, and nearly all this is carried off by every shower, and finds its way into the rivers and other watercourses, to say nothing of the direct pollution of rivers by the washing of clothes, persons, and animals.

Lakes and Marshes.—There are several collections of fresh water, forming small lakes, to be met with in the upper lands; but these generally are of no great importance as supplies of water for human use, with the exception of the "Mare Aux Vacoas," in the Vacoa district, which drains the surrounding hills, and from which the Tamarin and other rivers take their rise. Marshes are more numerous, and for the most part are found at or near to the mouths of rivers. A good deal of marshy ground is to be met with in the high forest lands, but it is usually covered by water. Those on the coast vary from one or two to 60 acres in extent, and contain in many brack water, though in some the water being supplied by numerous springs, is fresh. Of these there appears to be two varieties, one and the largest kind being of peat, with water underneath, is never dried up, as in the large marsh at the military post of Flacq; the other usually smaller in extent, being a mere mixture of mud and water as is found all along the coast between Port Louis and Black River. These, in the hot and dry seasons readily dry up; they are more or less covered with patches of rushes, and the mud is composed chiefly of vegetable matter in various stages of decomposition. At the river mouths, where the fresh and salt waters meet, "barrachois" exist, usually an extensive bank of fetid mud, which at low tide in all seasons, but especially so in dry ones, is left for many hours exposed to the sun's rays.

Climate and Meteorology.—From its position, near the centre of the Indian Ocean, and between the tropics, and far away from any large masses of land, the climate of Mauritius is, as might be expected, equable, and not liable to any marked and sudden changes, at the same time, owing to its very mountainous character, considerable local differences of temperature and rainfall exist; hence it seems scarcely possible, except by direct conveyance through human intercourse, that diseases should have any other origin, except one derived from and developing in conditions natural to the island itself, or in conditions resulting from ignorance or neglect of these laws of health which must be observed in all crowded communities. There are but two seasons in Mauritius, the hot and rainy one, from middle of October to middle of April: and the cool and dry one, from middle of April to middle of October. The temperature varies much: as the high lands of Moka, Plaines Wilhems, and Flacq are reached, the thermometer marking from 6° to 10°, according to height, lower than in Port Louis. During a period of 13 years, up to the end of 1865, the mean annual temperature at Port Louis was 83° during the hot season, and 74° during the cool. The rainfall in amount varies much from year to year; more rain falls on the windward and on the central parts than in the rest, January, February, and March are the rainiest months, but occasional showers fall all through the year. The winds, which blow from the south-east (trades) during the greater part of the year, give the atmosphere a cool and agreeable freshness; it blows pretty strongly, and is almost always dry. The wind from the north-east is generally prevalent during the three first months of the year, and is accompanied by heavy rains. The north wind is always a rainy one, as are also, though in a less degree, those from N.W.W. and S.W.; these winds are oppressively hot, and considered unhealthy. From December to April the island is liable to hurricanes; these cyclones are always preceded by great heat, and a sombre calm and heavy atmosphere; these storms usually begin by a wind from the S.E. or E., and so soon as the wind turns to the north the violence of the storm gradually diminishes. Hurricanes of late years have neither been frequent nor severe, though the one occurring in 1861 (and the last) continued for six days, and did much damage. The island is singularly free from great thunderstorms; however, during the months of the hot season, and especially from November to January, thunder and lightning are not infrequent. Slight shocks of earthquakes have been occasionally experienced,

Population.—The census of 1861 gave a total of the resident population amounting to 310,050; at the end of 1865 it had increased, by Indian immigration principally, to 340,835, exclusive of military (of this number the Indian population amounted to 245,852), and in the first six months of last year, 1866, as many as 3,577 (Indian immigrants) were added, since which we are not aware of any additions from that source; thus, before the epidemic broke out, the population may be computed at 344,412 souls; of this number, 95,205 are classed under the head of "general population" (the remainder being Indian), comprising Europeans properly so-called, and those born in the island of original European stock, Mulatoes, Chinese, Arabs, Persians and Africans from Madagascar, the Mosambique Coast, and Abyssinia.

Meteorological Phenomena of the Hot Seasons, 1866–67.—In the absence of the observations of the Meteorological Society, at present we can only speak generally on this subject; during this season the following were its marked characteristics:—

1. Absence of usual amount of rainfall.
2. A higher temperature, and continued much longer than usual.
3. Absence of usual amount of thunder and lightning.
4. No hurricanes occurred.

In summing up this, we may say, that the marked characteristic of the season was a dry stagnant state of the atmosphere, with high and long-continued temperature.

Changes which have occurred in the General Physical Features and Population of the Island.

1. A very large amount of forest land has of late years been cleared for purposes of supplying fuel and for cane cultivation.
2. Immense increase in number of inhabitants, not in the usual manner, by excess of births over deaths, but by increased immigration from India.
3. This increase of population has been followed, by the close aggregation into villages, of an immense number of Indians, who, their term of engagement being completed, have settled in Mauritius in various employments, and who, being under no surveillance whatever, have, from their well-known filthy habits and mode of life, become a dangerous nuisance.
4. The amount of rainfall for past year much diminished; also, and for several years past, serious decrease in the amount of water in the rivers.

DISTRICTS.

Port Louis (see sketch plan).—Area, 10 square miles; population (before epidemic), 80,000, or 8,000 to the square mile. This by far the most densely-peopled district in the island, includes, besides the town which gives its name to the Canton, Grand River, N.W., Rochebois, and Vallée des Prêtres, it is situate on the westward or leeward side of the island, and forms a rough segment of a circle, the circular boundary being formed by a range of hills, and the straight one by the sea; its surface is nearly flat, and apart from the mountains but a few feet above the sea level; several valleys exist, formed by the spurs of its hilly wall; these hills lie to windward and form, as above described, rather more than a semi-circle, consequently in the hot season the movement of air is but slight, and the heat very oppressive. The soil of the greater portion of the district, and especially that on which the town is built, consists of the detritus of the rock of the adjoining hills, it is very tenaceous, resembling clay in appearance, varies in depth, which is greatest as it nears the sea; mixed with it are boulders of undecomposed basalt, rounded as if weather-worn at some former period. In the lower parts of the town, and near to the water-edge, many houses are built on what was once a portion of the harbour, filled up by the deposit of silt from the hills and town during the rainy seasons. The harbour through a large opening in the coral reef, runs deeply into the land; the rise

and fall of the tide is insignificant, and the whole of the surface drainage of the town is conveyed into it by several foul rivulets, which, having no volume of water, nor sufficient fall as a sewer, deposit part of the filth with which they are charged in the beds and along the sides of these streams, but by far the larger portion ultimately reaches the harbour, where it remains, and at low water is exposed to the sun. There are two forts, which command the entrance of the harbour, viz., Forts William and George. The ground lying between Fort William and the town is quite flat, and parts of it to windward a tidal marsh. The cemetery is also to windward and to the S.W., and close to it is much marshy ground and salt-pans. From the fort, which was garrisoned during the epidemic by Royal Artillery, scarce one escaped the fever. Fort George, where large barracks are being constructed, has to windward a large nearly stagnant part of the sea (*Mer Rouge*), of many acres in extent, which formerly had sufficient depth of water to admit coasters, but which now is gradually being filled from the rising of the coral reef, but principally from the continual deposit of vegetable and other matters conveyed to it by several of the sluggish filthy streams which traverse the town. The stench from this mass of putrifying matter was at times most disagreeable. The Caudan, another nest of malaria, where many of the married families of the Royal Artillery and Royal Engineers were housed, and where are the workshops of the latter, is situate on a low-lying portion of land, the greater part of which was reclaimed from the harbour by the deposit from two small streams, which, after draining that portion of the town above the Caudan, enter the harbour at this point well charged with filth of all descriptions, and which always gives off an abominable stench. The Caudan is but a short distance from Fort William. Within a few hundred yards of the Caudan, and to windward of it, is located the Artillery Barracks, which, from its close proximity to this low-lying marshy land, and to a foul tidal stream, which holds its sluggish course all along the seaward aspect of the buildings, can never be in a good sanitary condition. A short distance from these barracks, and still to windward, are situated the Line Barracks; they occupy a large space of ground of about 22 acres, but are surrounded by a poor and densely-populated neighbourhood. The soil on which they are built is, as before stated, tenaceous clay; at this part from 2 to 6 feet in depth, and lies directly on the hard basaltic rock itself. The drainage is imperfect, there not being sufficient fall, and from the nature of the soil, there is scarcely any percolation for the surface water, which usually disappears by evaporation. The buildings themselves have been so often described, repetition here is not thought advisable; suffice it to say, that the barracks are fairly good and well ventilated, and, from the considerable extent of space which they enclose, freer movement of air is permitted than in most other parts of the town; still, from the noted insalubrity of their site, it would be without doubt far better to construct others in the cooler and more elevated inland parts of the island, as midway between Port Louis and Mahebourg; and now that a railway connects these towns, there would be no difficulty in conveying troops in case of need to either. Port Louis has always been a dirty, overcrowded, undrained town, and, consequently, very unhealthy, and now that malarial fever has shown itself to be an additional evil, there can be no doubt that, on sanitary grounds, troops should no longer, at least in any number, be kept there, and in so small an island it is only a question of a few miles (7 to 10) to place the barracks in a healthy, mild, and equable climate, from a close, hot, and pre-eminently unhealthy one. If steps are at once taken to drain, and otherwise purify the town before removing the troops, in all probability there will be much sickness among them, and especially from "typhoid fever," from disturbing soil which is saturated with the decaying filth of many years. The same objections apply to the hospital; the buildings themselves are well ventilated, fairly cool—cooler than barracks, but the site is a most objectionable one, being close to the commercial centre for traffic, in its busiest and noisiest part, nearly a mile from the barracks, has the railway within a few feet of its outer wall, and the filthiest portion of the harbour, the "Trou Fanfaron," but a few yards off. Among the other *desiderata*, it has no wards for noisy patients, nor for those suffering from dysentery. Fort Adelaide, constructed some years ago to command the town and inner anchorage, is a stone fort, built on the extremity of a small spur running down from the

mountain chain, and terminating at the upper part of the town: it is usually garrisoned by two companies; the rooms are casemated, not well ventilated, very close, and hot. Further on, will be found the history of its garrison during the fever epidemic; the water supply for the barracks is plentiful and very good; is taken from the Grand River, N.W., at some distance from its mouth, and conveyed to Port Louis by iron pipes.

Pamplemouses.—Area, 87 square miles; population 59,000, or 678 to the square mile; a large part of this district (which lies to the north of Port Louis) is flat, and from this an upper portion runs up among the inland hills, while the rest consists of low ridges of basalt with intervening valleys, the whole bristling with detached basaltic rocks; there is but a very gradual slope towards the sea; along the shore is a band of varying breadth, and about 15 miles in length, of coral sand formation, which at Cannonier's Point expands into a tolerably large plain, at the extremity of which is placed the military post, which gives accommodation for 50 men, adjoining to it are lighthouse and an extensive quarantine establishment for small-pox; the whole of this establishment was lent by the civil Government to the military as a convalescent depôt during the epidemic, for part of the 13th Light Infantry and for the Royal Artillery; from its exposed situation and being almost treeless, there is always ample movement of air in the hot season; the winds are all sea breezes, and in the cool season the trade wind blows over so small a portion of the land before reaching the post, that it also may be termed a pure sea breeze; there is much marshy ground in the district along the coast as well as at the mouths of the rivers, and in many parts of their course these streams, as they approach the sea, pass through very nearly a dead level; attached to many of the estates and private houses, are large ponds, or "*bassins*," which, being stagnant, are for the most part half filled with weeds and decomposing vegetable *debris*. In many parts collections of fresh water lie for a time after the rainy reason until (from the impervious nature of rock which forms their bed) they disappear by evaporation; this district, as well as the adjoining one to the east of it, *Riviere du Rempart* (area, 58 square miles, population 21,468, or 370 to the square mile) resemble each other so much in their general features, especially in both having so much stagnant water and marshy land, that it will save repetition to consider them together; these districts, considering their extent, are but scantily supplied with water, the rivers being few and of no volume, much of the water being taken from them at the upper parts of their course for the supply by canals of portions of these districts and Port Louis; also much is expended in irrigation; apparently this part of the country was never well supplied with water, as at the taking of the island in 1810 by the English, the troops, who were disembarked at Grand Bay, in the district of Pamplemouses, suffered greatly on account of the want of it, during their march on Port Louis; the whole ground was then a dense forest, indeed the formation of the ground shows that no other streams but those now known ever existed. Riviere du Rempart has a good deal of flat rocky ground resembling a pavement, which is called Plaine des Roches; it is undermined by caverns such as are frequently found in lava-formed countries; both these districts suffered severely from fever.

Flacq.—Area, 113 square miles; population, 46,000, or 370 to the square mile; this district lies to the south of Rivière du Rempart, and is the largest in the island, and one on which the fever epidemic fell lightly, indeed the deaths from fever were scarce, if at all, above the average of past years. It has a coast line principally of coral sand formation, about 19 miles in length, but of no great breadth, interrupted here and there by indentations, usually opposite corresponding openings in the coral reef, forming harbours; the sand dunes are nearly everywhere thickly planted with the filao tree, and have in addition a covering of coarse grass; the ground generally in the district is very rocky with a soil, in the low lands, of a light porous loam, much of it of a red colour (as at Pamplemouses), from the presence of iron, and is very fertile; the soil in the upper lands, where in many parts the forest has been cleared, is the usual tenaceous clay, which, by the addition of guano, is rendered equally fertile for cane cultivation, as the rich loam of the low-lands. The ground from the coast rises gradually in one long slope, varying in breadth from four to six miles until it reaches the mountains, where the

rise becomes more rapid; these mountains have, for the most part, their summits and upper slopes clothed in forest. Flacq is fairly well watered, having several rivers traversing it, one of which is the largest, as to volume of water, in the island; in the low lying lands, and near the sea, there is much marshy ground, especially along the course of the rivers at their mouths (Barrachois), where the usual bank of fetid mud is found, which exists at the mouths of nearly all the Mauritian rivers; there are also several collections of brackish water, locally called "mares," along the coast, which are fringed with mangrove bushes and studded pretty generally with rushes; the temperature in the low lying lands is generally from 3° to 4° lower in the hot season than Port Louis, and the upper lands enjoy a cool and agreeable temperature at all seasons; the prevailing wind is the S.E. (trades), which is here a sea breeze, and which blows pretty steadily for eight or nine months of the year. The military station "Post of Flacq" is placed at the head of one of the small harbours and faces nearly due east; the garrison has usually consisted of 100 men; the barracks are built close to the shore, and about 15 feet above the sea level; the ground is flat and well shaded by large trees, the post being nearly on the windward side and far from the hills, there is always free movement of air; within 200 yards of the post and to the south of it there is a large marsh of some acres in extent, communicating with the sea and with the mouth of the "Riviere du Post," which has a thickness of five or six feet of peat, with water underneath, and which is saturated with the refuse of a rum distillery in the neighbourhood; between this marsh and the post there is a dirty undrained village, which, from pigsties, dung-heaps, and other filth, has always been in a dirty condition; there exists also a good deal of damp ground round the post during and for some time after the rainy season, from overflowing of rivers, &c. Distant from Flacq Barrracks 11 miles to the south, and still on the coast line, is the small military post of Grand River, S.E.; it is placed on a rocky spur of the neighbouring mountains, but separated from them by a river, Grand River, S.E.; the land runs out seawards, and facing the east is well exposed to the sea breezes; trees have been lately planted, which soon ought to furnish shade which is much wanted; its aspect and elevation is favourable, and there are no Indian villages to windward nor near to it on any side; it has usually accommodated 30 men.

Grand Port (area, 112 square miles; population, 41,200, or 368 to square mile) lies to the south of the last-named district, and separated from it by a mountain range, and by the "Grand River, S.E."; the area is nearly the same as Flacq, but the population is considerably less; the coast line is about 30 miles in length, and placed in the centre of it; and facing a magnificent bay is Mahèbourg, the chief town of the district, and the military station; the coast from the Flacq or northern boundary to Mahèbourg, about 14 miles in length, is broken into many small bays by spurs from an outer mountain chain, which runs down to the sea; between these ridges are well wooded, and in part well cultivated valleys, traversed by several small streams; there is much marshy land in the upper parts of the valleys, as well as along the course of the streams; they are, however, always covered with water. At the mouths of all these rivers there is more than the usual amount of mud exposed at low water; there are no sand-banks on this portion of the coast, the soil in many parts, a rich loam, being cultivated to near the water's edge; the remainder of the coast line on the other, or south-west side of the town, is for the most part coral sand formation, broken in one or two places by indentations, and in one part, no reef existing, the sea breaks directly on the rocky shore; the sand dunes, for miles, are planted with quite a forest of filao trees; this, the larger half of the district, is an extensive plain, rising gradually inland to the mountains; it is less rocky than Flacq, but like it entirely devoted to cane cultivation; there exist but few collections of stagnant water, and but little marshy ground is to be found along the river. During the rainy season, and for some time after, various hollows, locally called "Mares," filled with clear, pure water, some of them miles apart, have subterranean communications with each other, from the water filtering through the cracks in the stony soil. The town and military station of Mahèbourg are built on low-lying narrow spit of land a mile in length, and varying in breadth from three-quarters of a mile on the south to a mere point on the north, locally called "Pointe des Anglais,"

This peninsula is formed by the Rivière la Chaux, on the west, and on the east and north by the sea. The town, which contains 6,000 inhabitants, is, like all other Mauritian towns and villages, badly built, undrained, and consequently very filthy; the water supply is good and sufficient, the source being the Rivière la Chaux from which it is taken, about two miles from its mouth, and conveyed by a canal of masonry, in parts only covered, to the station, where it is distributed over the barracks by iron pipes. The rainfall is more abundant on this, and indeed all along the windward, than any other part of the island, owing to the prevalent sea-breeze, which is always more or less charged with vapour, blowing with much force against the series of mountain chains forming the inland boundary, where from pressure and parting with its heat against the colder hills, condensation takes place: possibly also from the resistance offered by the forests, though this, as a cause of rainfall must be very slight. In 1865, when the battalion was stationed (head-quarters) here, the rainfall during that year was—

	Inches.
Upper part of the district	192·45
Lower down....	135·31
On coast ...., ...	100·84½
And at Port Louis during the same year....	44·737

The barrack accommodation at Mahèbourg is too limited for the number of troops which have been usually quartered there; still Mahèbourg, as a station, has always been a healthy one, notwithstanding this overcrowding and the apparently unhealthy site; the mouths of two of the largest rivers in the district meet the sea within 500 yards, and to the north of the point of land near which the barracks are situate, where they have deposited an enormous mass of debris, which from its quantity not unfrequently changes the course of the channel, and at low water exposes its many acres for hours to the sun. On the south-west of the barracks along the coast there are many salt-water lagoons, fringed, and in some points covered with mangrove bushes, around whose many roots collect much fœtid mud; close to, but to windward of, these lagoons, and on the northern extremity of the sand dunes before alluded to, is placed the camp for rifle instruction, Point d'Esney, and at a part well shaded by filao trees. This district has still a good deal of forest land in its upper section, which, however, is daily lessening.

Savanne.—(Area, 92 square miles; population, 233,317, or 253 to square mile.) This district, like its neighbour Grand Port, escaped the epidemic malarial fever (the deaths returned as "fever" during the period being actually fewer in number than in corresponding periods of past years); they also resemble each other in their physical features Savanne, however, has less marshy ground, and the mouths of its rivers, from their greater rapidity, are freer from deposit. The reef also is much closer to the shore, so that the sea between is always more agitated; along a considerable portion of the coast line are the usual low coral sand dunes, planted with the filao tree; part also is high, bold, and rocky, and free from coral reef; the district is cool and healthy, and faces the south-east, and is well exposed to the trade wind. No troops have been stationed here for 19 years; the forest land is still very considerable.

Black River (area, 94 square miles; population, 18,902, or 201 to square mile), is an extremely mountainous district, on the leeward side of the island, having but a small amount of flat ground except towards the northern boundary between the mountains and the sea. There are, however, several deep valleys which run up among the hills, and towards the "Morne," or southern extremity, and an inconsiderable portion of plateau exists at an elevation of about 800 feet; all or nearly all of this ground is under cane cultivation, in the culture of which irrigation is extensively employed. There are several rivers in the district, which, in the upper portion of their course, are very rapid, but which become sluggish on reaching and passing through the low-lying alluvial lands on their course to the sea. At the mouths of these streams, there exists large deposits of the usual black fœtid mud. The military post of Black River is situated on the coast, within a few feet of the sea, and at the mouth of the Black River; it occupies a portion of flat ground running up inland into a narrow valley. The hills in this half of the district run close down to the shore; some are of

considerable elevation, and are placed to windward. Hence in the hot season the heat is very great, and the movement of air very slight. After heavy rains, a great amount of vegetable debris is brought down by the river, and scattered along the shore, frequently to a thickness of some feet. It is the most confined, and consequently the hottest military station in Mauritius. There is much marshy and damp ground along the rivers in their course through the flat lands, and a good deal of stagnant water and saline swamps are to be met with between the Tamarin River and the boundary of the district to the north. The post has usually been very healthy, in spite of its heat and closeness, but suffered fearfully from the malarial fever of 1867.

Plaines Wilhems.—(Area, 70 square miles; population 31,000, or 443 to a square mile). This district is made up of two distinct portions, an upper and a lower. *The upper part* forms a large portion of the central plateau of the island, reaching, as at Curepipe, midway between Port Louis and Mahebourg, to a height of 1,500 feet; about 7 miles below Curepipe in a north-west direction, there is a second extensive plateau on which it is proposed to construct barracks for the troops. The soil in the upper lands is moist and clayey; lower down the usual red earth, or the dark porous loam, and on the coast, here and there, coral sand. There are several rivers which, for the greater part of their course, run between high precipitous banks. The water supply is taken from them in the upper lands and distributed all over the district by open canals; the water in them is generally much polluted. In this half of the canton there is always free movement of air, and the temperature is ordinarily 7 to 10° lower than at Port Louis. *The lower portion* is hot, dry, and stony, and not so extensively cultivated. Near the sea, and along the whole line of coast, there is much swampy land. At the northern extremity of this coast line, and close to the extensive embouchure of Grand River, N.W., is placed the military post of Petite Rivière, where one company is permanently stationed (in wooden huts) all the year round, and where, during the cool season, the rifle practice for the greater part of the troops is carried on—these men being under canvas. The soil is sandy, and the country slopes inland very gradually from the post. The water supply is brought from Grand River by water carts, not usually very good. The Port Louis hills are near enough to make their influence felt by preventing free movement of air.

Moka.—(Area 68 square miles; population 19,473, or 283 to a square mile.) This district, like Plaines Wilhems, must be divided into an upper and a lower portion. *The upper forms* an extensive well-cultivated plateau, placed behind the hills, which wall in Port Louis and Pamplemouses, and has an elevation of from 800 to 1,200 fret above the sea. The temperature varies from 6° to 9° below Port Louis, and the climate is always cool and agreeable. The rainfall (1865) in the upper parts of the plateau is large, 147 inches in the year, and at its lower border the amount in the same year was 79·44. The water supply is taken from the rivers high up, and, as elsewhere, distributed over the district by open canals. Two small detachments of a line regiment are stationed here forming guards for the Governor and for the General, both of whom reside in the district. *The lower portion* is very narrow, and slopes rapidly down to the low ground in the suburbs of Port Louis. It is shut in by a portion of the hilly range round the town and is consequently very hot. It contains a large population, principally Indians. Moka has no coast line; still there is a good deal of marshy land in this lower portion.

II. Comparison between Fever and Non-Fever Districts.

In malarial countries the soils which have been found especially to give off malaria, are—

1. Marshy lands.
2. Freshly-cleared forest lands.
3. Loose soil, with or without much apparent vegetable life, resting on some impermeable rock, so that the moisture which lodges in it is given off by evaporation, and as it cannot pass away into great depths of soil, and so leave the loose porous upper crust with its vegetable debris to dry up, so this upper layer is always more or less moist.

The two factors necessary in such soils to get up malarial disease are—

1. A certain amount of moisture.
2. A certain height of temperature.

In Mauritius all the soils above mentioned existed, and in 1866–67 the two factors required to produce malaria were found. The marshy lands were *not* the spots where the fever was most prevalent and severe; it is the third variety of soil which exists in most abundance in Mauritius, and such soil was found on the west coast from the northern end of the island to the Morne in the south. This presented the universal characteristic of being loose, of slight depth, resting on rock, impermeable to water, and the whole of this soil has for years been receiving the drainage and all the filth carried down from the higher inland parts, filth arising from decomposing vegetable matter; and filth arising from the washing down by rain of inhabited lands covered with human excreta and discharges of all kinds. The sea bottom too is composed in many places of a sort of mud, of sand, and organic material in a state of decomposition, which is not removed by the currents, but remains undisturbed in the shallow and quiet waters which are enclosed and protected by the land on one side, and by the coral reef on the other. The difficulty consists in separating the true causes of the fever out of the profusion of unhygienic conditions which abound in Mauritius. We think too much has been made of mere dirt and unsanitary conditions about Port Louis and its neighbourhood. No doubt foul smells and want of drainage are all bad, and all either cause disease, or assist in increasing the mortality, but it is not to these elements of disease that we must look for the predisposing causes of the malarial fever, for it was as severe as possible at the post of Black River; indeed, much more so among the men and officers than in Port Louis; yet this post has no Indian villages near. Its only fault consists in its being situated on flat alluvial soil, probably formed from debris brought down by the river, which is close to it. The quarters are placed well apart, and the water supply is good; its soil, therefore, with the hot and close situation, are alone to blame as the agents in causing the fever. At first sight one would regard the station as a healthy and pleasant one; indeed, sickness amongst the men stationed there was formerly rare, though it was far hotter than Port Louis, being much more hemmed in by mountains, and having far less movement of air. The Bay of Black River has a firm hard bottom of a most intimate mixture of vegetable debris, and mud brought down and deposited by the river, and it is not for nearly three-quarters of a mile from the shore, seawards, before the ordinary coral and sandy bottom is met with. Were this to be upheaved and exposed to the sun, malaria would certainly be given off, and it is just on such a soil (which has been elevated above the sea level long ago, as proved by the presence of an old coral reef now on dry land) that the post is built. An indiscriminate onslaught on all antihygienic conditions can only end in disappointment, for were Port Louis to be drained to-morrow, it would not of itself prevent fever; it will only be by thorough surface drainage of the flat lands near it that fever will be kept off, and this, from the level nature of the soil, will be very difficult to accomplish. There was some prevalence of fever in elevated parts of the districts which seemed unlikely to be malarious but in these cases, the malaria arose from the exposure of vegetable mould to the direct rays of the sun, by the cutting down of forests; there is little doubt but that this was in some places the origin of the malaria. The actual marshy land was certainly not the most malarial, as much of it we find in the high central parts of the island.

The following Table gives a correct idea of the prevalence of fever in the different districts of the island during the month of April, and first week in May, 1867:—

Average Daily Percentage of Deaths.	April.	First Week in May.
Port Louis	183·9	202·7
Pamplemouses	50·7	43·5
Black River	24·0	20·1
Rivière du Rempart	19·2	15·1
Moka	11·2	11·1
Plaines Wilhems	7 6	8·4
Flacq	4·7	9·8
Grand Port	2·7	4·7
Savanne	1·6	2·0

The three last on the list, and most certainly the two last, may be said to have been free from fever, as in these districts the deaths from fever during the epidemic were, if not less than in corresponding periods of 1865, at all events but equalled the mortality of that year. No doubt many of the fatal cases reported were of people who had come from the fever districts. Again, the comparison with the lower portions where the disease was most deadly. A upper parts of Plaines Wilhems and Moka were slightly, if at all, touched in line drawn from the Ile d'Ambre on the north-east to the Morne on the southern end of the island, would separate the fever districts from the healthy ones, the former being on the west, and the latter on the east side. The deaths occurred among about half of the population, so that these deaths calculated in relation to the whole population of Mauritius would not at all represent the true rate of mortality.

II. Comparison of Fever with Healthy Districts.

Fever Districts.	Healthy Districts.
1. Mostly on leeward side of the island.	1. On windward side of the island.
2. More densely populated.	2. Less densely populated.
3. Temperature higher.	3. Temperature lower.
4. Sheltered from prevailing south-east wind by inland mountain chains and other high ground.	4. Fully open to prevailing winds.
5. Soil densely charged with decaying vegetable and animal matters, also the bottom of shallow sea lying between shore and reef; the water nearly all along the coast has little motion, refuse, in consequence not being washed away, accumulated at bottom or cast frequently back on the shore.	5. Soil not charged with such an enormous amount of decaying organic matter, and sea between reef and shore deeper, and bottom cleaner from constant movement of the water, by which refuse is removed and carried off.
6. Extensively cultivated but *not* drained; scarcely any forest land.	6. Less extensively cultivated, and a considerable amount of forest land remaining.
7. Smaller rainfall.	7. Much greater rainfall.
8. More stagnant water and marshy land, and much of this dried up during the past season.	8. Very much less stagnant water; and marshy ground from greater rain. fall, almost always covered with water.
9. The hills and slopes from them do not run direct to the sea, but terminate in a varying extent of flat land, derived in many parts on the coast from filling up of muddy bottom of sea.	9. Hills run more directly or by steep slopes down to the sea, thus leaving a less extent of flat ground.
10. Less drainage by rivers, many of which have become almost dry during past years.	10. Greater drainage by rivers, which are more numerous, and have a larger volume of water and are more rapid.

But one break occurs in this long fever-stricken strip of land, and this is, at the military station of Cannonier's Point, which, as far as soil and situation on the sea shore is concerned, bears a marked resemblance to the post of Petite Rivière. It may be useful to compare these two, and also the station at Black River, all being on the west coast. Petite Rivière station is placed on sandy soil, not far from the Port Louis range of hills, and receives drainage of a large portion of country. Black River station is placed on a flat piece of ground formed of the mud brought down by the Black River, and by the rains from the high hills, which closely hem it in to windward. In these two districts the fever raged with great intensity. Cannonier's Point station is placed at the extremity of a sandy spit, which juts out into the sea, and is separated from the slopes running down from the hills by a broad flat sandy plain. It consequently has not been charged with vegetable debris brought down from the higher lands. Moreover it is a very long distance from these hills, and the movement of air in consequence is free. There was no fever here, though within a radius of a mile or so it prevailed extensively. The detachment 2nd Battalion 22nd Regiment occupied the post until about the end of February, no case of fever showing itself among them, although it was raging furiously all round. The soil of the post is mostly coral sand, and is remarkably clean and free from damp decaying vegetable matter.

General Conclusions on the Causation of the Fever Epidemic of 1866–67.

1. That for years there has been a steady accumulation of organic debris washed down from the loftier parts of the island, and deposited in the lower and level lands, which are formed, as already stated, of a shallow upper layer, resting on an impermeable rock, and consequently evaporation is the sole way in which the moisture can be got rid of.

2. That, as a rule, during the season, when the temperature is highest, there is abundance of rain, and more especially towards the end of the hot season.

3. That in the season 1866–67 there was little or no rainfall, and the temperature was very high, and kept up for a much longer period than usual.

4. *That the places that suffered most from fever were*, par excellence, *those which are always hotter and dryer than the other parts of the island.*

5. That many other places which did *not* suffer from fever, yet presented all and other conditions like those which did suffer, but were distinguished by having a lower temperature and a greater rainfall.

6. That in the majority of instances the malaria was developed, not in actual marshy ground, but in the thin, porous soil above alluded to; and that, in cases where the fever occurred at a considerable elevation above the sea, it was due to the sun's rays acting in a very dry and hot season on the soil charged with vegetable matter, exposed to its influence by recent cutting down of forests and underwood.

7. That the mere accumulation of filth of all kinds in the densely-inhabited districts had no influence whatever in the origin of the fever, as it was almost as fatal in the sparely populated country districts (as Black River), as in the dirty and densely-peopled districts (as Port Louis).

8. That it was entirely of malarious origin, and in every form, we might say, perfectly curable by the administration of quinine in large doses; but that, from the intense character (or amount of malaria), the fever, if untreated, rapidly produced a low and depressed state of system, by which the great mass of the deaths were caused.

9. That the "bilious remittent," and other such forms, were complications mixed up with the fever, and due in most cases to prior attacks of fever, or to long exposure to a powerful malaria, and that such low cases were not seen amongst the soldiers, owing to the fact that they had the advantage of having their attacks treated by full doses of quinine and stimulant treatment of various kinds, consequently it is unnecessary, nay, untrue, to suppose the fever to have been anything more than a malarial fever, whose danger depended chiefly on want of treatment and proper food, unless the absurd proposition is held that it differed in very important particulars, according as it attacked civilians or military.

10. That it was not in the slightest degree contagious.

11. That the so-called "Bombay fever"* of Mauritius merely means a fever especially prevalent amongst Coolies, who had come from the Bombay Presidency, and that it was in past years for the most part confined to them; that this was a malarial fever, occurring in a people who had come from a malarious country, and whose constitutions had been malarialised there, consequently we can suppose a very small amount of malaria (or exposure to a lower temperature than usual) would cause relapse of their old complaint, but which was not sufficient to give fever to those who had never before suffered from the effects of malaria, and it was amongst those already malaria-poisoned and others who had had repeated attacks of fever unchecked by medicine, that the more serious kinds of fever were found, such as much bilious vomiting, yellowness of skin, &c.

12. The actual direction of the wind did not have much influence in actually carrying the miasm at the time, for the winds were all local and varied in different parts of the island.

13. That the whole and sole cause of the outbreak of fever in an island hitherto almost free from it, was excessive heat, with drought, acting on a soil which had, as it were, been accumulating the elements of malaria, and only waited for the exciting causes to set it free, and moreover, owing to the absence of rain, the hot season more resembled the hot season of tropical climates, as India, &c., than heretofore has been the rule; as in Mauritius, the hot and rainy seasons were synonymous terms, but this season, owing to the absence of rain, a continuous hot season, resulted; in other words, in Mauritius hitherto the rain has acted as a preventative of malaria, this coinciding with the fact that even this season those districts, which as a rule are most rainy and coolest, were free from fever.

14. It may be noted, too, that basalt, of which the island is chiefly composed, is a rock which absorbs heat, and parts with it very slowly, hence a higher temperature may be kept up in the soil even during the night, than the temperature of the air; and, further, we may note that a considerable portion of the soil is ferruginous, as is markedly shown in the district of Pamplemouses, one of whose cantons, "Terre Rouge," is so called from the colour of the ferruginous soil.

III. History of the Battalion in Relation to the Fever.

It is necessary to go back for a few months of the year 1866, in order to include the whole hot season of 1866–67. The battalion came to Port Louis from the various detachments on the 12th July, 1866, and remained in the Line Barracks for the rest of the year. During this period the number of cases of ordinary fever (continued fever and fibricula) admitted were—2 in July, 0 in August, 2 in September, 2 in October, 3 in November, 28 in December; and of "enteric fever" there were 5 admissions; 3 men died within the period, viz., 1 enteric fever, 1 peritonitis (amyloyd degeneration of kidneys), 1 hepatic abscess and dysentery.

The first case of fever entered as intermittent occurred on the 18th October, and the first batch of cases indicating a greater than usual prevalence of fever commenced on the 23rd December. Most of these cases, and those occurring for some weeks after, were entered as "febris continua," but seeing that such cases greatly increased in number, and that later decided symptoms of intermission appeared, it is highly probable, nay, we think certain, that all were due to the same disturbing agency, viz., malaria, and this would seem to lead to the generalization that the ordinary febricula (fibris c.), always more or less prevalent in the hot season, especially at Port Louis and its neighbourhood, has always been due to malaria, which this season became so much more powerful or concentrated as to produce a greater effect, viz., the fierce malarial fever of 1867.

* *Bombay Fever.*—Surgeon-Major Small, writing from Mauritius on July 18, 1868, states that two distinct fevers have been included under this term, viz.: true *enteric fever*, with the characteristic lesions in "Peyer's Patches"; and ordinary *malarial fever:* though in cases of the former disease, the *post mortem* signs of malarial fever were in many cases superadded.

1867. *January.*—There were 37 admissions for continued and intermittent fever, and two for enteric fever. The deaths were 3; one man from enteric fever; one woman, ambustio; one child, neglected dysentery. Hitherto, though there were a great many cases of fever prevalent among the civil population, and the deaths were considerable, yet no great alarm was felt, especially as the rains which had been expected would probably not longer be delayed. The heat during the month was very great, the breezes slight and local, and the rivers very low.

February.—The admissions were 93 for continued and intermittent fever, and two for enteric fever; the deaths were three—two men, chronic hepatitis and dysentery: one child, dysentery. Each day of this month the fever increased in intensity, and the deaths among the civil population were very numerous. The many military guards about the town, furnished by the Battalion, were removed, thus reducing the night duty to a minimum, and the men were strictly kept in the barracks and verandahs during the heat of the day. The anticipated favourable change in the weather and the long-expected rains did not appear, and the poorer parts of the town and suburbs began to look empty and lifeless. On the 15th of this month some 40 sick and convalescents (not from fever only) were sent down to Cannonier's Point, in order to make room in the hospital for the increasing numbers of fever cases; as, besides our own, we had the sick from three detachments of the 22nd Regiment. For this purpose the detachment 22nd Regiment there stationed was removed to Flacq, and the whole of the large quarantine establishment placed at the disposal of the military authorities as a convalescent station: from time to time, until the end of March, this drafting of convalescents continued to Cannonier's Point. As far as we can at present say, there appears to have been no case of malarial fever, which took its origin at this post; but as in the neighbourhood the disease was very prevalent, it is extremely difficult to find a case in point, viz., of any one who had remained at the station without going into the malarial districts; but as will be seen hereafter, the number of admissions, for relapses of fever, were fewer than at other stations.

March.—The admissions for malarial fever were 310, and this (owing to the detachment of convalescents sent to Cannonier's Point) out of a smaller number of men, no admissions for "enteric fever," this month, there were three deaths—one man from enteric fever, one man from heart disease, one child from malarial fever. To the end of March there had been no deaths in the regiment, except of one child, which could be attributed to the malarial influence. The deaths among the civil population were now terribly large; and the town and its neighbourhood presented a very different aspect to the usual busy, crowded scene. The wharves and quays almost deserted, the usually large number of carriages and carts had vanished, and from the death or flight of the inhabitants to other districts, the small huts or houses forming so large a portion of the town and its suburbs were left untenanted, while a few gaunt, fever-stricken shadows—Indians and Creoles—with handkerchiefs bound round their heads, might be seen here and there drowsily reclining under the shade of a tree. The change from the usual noisily busy scene to one of such stagnation was extremely painful, and not relieved by the numbers of funeral trains constantly passing along the roads leading to the cemeteries.

April.—It was thought necessary to remove the battalion out of the infected town; consequently, on the 1st of April, the head-quarters, numbering 391 men, 24 officers, 42 women, and 70 children, proceeded by steam to Flat Island, the quarantine establishment for cholera. This island is situated to the north of, and distant about six miles from, the nearest point of Mauritius. It is composed, in great part, of nearly level ground, rising at its western extremity into an irregular hill composed of volcanic ash, and containing fragments of coral and of lava (basalt), in fact the remains of a small crater. From the hill a broad lava stream (now basalt) flows by a gentle slope to the northern extremity of the island, where there is a detached mass of basalt called the "Pigeons'-house Rock," from its honeycombed appearance. The rest of the island (about one-eighth of its area), is composed of fine coral sand, with occasional blocks of coral. On the eastern side this sand forms a high, broad, grass-covered bank, with a steep slope to the sea-shore; and another, less inclined, towards the centre of the island, rising again as it approaches the basaltic portion, thus

forming a small valley. On this bank were placed most of the tents in which the men and officers were lodged. Proceeding westward, and crossing the small valley, we meet with an encampment for married people; and ascending by a gentle slope, the two hospitals are reached, built one of stone, the other of wood, on a small spur of the hill, and at some elevation above the sea. Descending from these we reach a small bay, from which a pier projects, on the shore of which are placed twelve wooden huts, for the accommodation of the coolies when in quarantine. Six were placed at our disposal, the remainder, at about 300 yards distant, being occupied by 200 Indian and other convicts, with their guards. These huts are mere sloping roofs, placed on low walls about two feet from the ground; no windows, but with a door at each end; no flooring, the ground being sand and rather damp, and almost on a level with the sea-shore. The only means of access to the island are by—first, the pier on the west coast, which, owing to the usually heavy rollers, can seldom be used; and, secondly, by a pass through the reef on the east coast. This is a narrow and very shallow gap, so that only boats of small size, about 12 to 14 tons, can get through; and from its situation, *i.e.*, facing the south nearly, it is often closed when a strong wind is blowing from the prevailing quarter, the south-east, and in very calm weather it is frequently impracticable on account of the heavy swell coming up from the west. A small island (Gabriel Island) lies to windward and at a short distance, the two being connected together by a reef, the sea between being very shallow. The drinking water was obtained from a Normanby's distilling apparatus. The few wells in the island, from their being placed on the coral sand soil, were very brack. Some tanks for collecting rain-water were attached to the hospitals and at the huts. The weather remained hot for some ten days after our arrival; and owing to the amount of necessary fatigue work, in unloading stores and carrying them to the camp, a very large number of men were laid up with fever. About the middle of the month there were some heavy rains, with strong and cool south-east winds, indicating the commencement of the "trades" and the cool season. Its effects were seen in the number of cases of dysentery, which in Mauritius is usually most prevalent at the end of the hot season; and owing to the strong wind, no communication for several days was possible with the mainland, so that only very hard biscuit was issued to the healthy and sick. Fresh meat was issued every day to sick in hospital, and daily to nearly all out of it. Unfortunately, also, our supply of quinine ran out, but this only for a few days; and these various difficulties harassed us till the battalion returned once again to Port Louis on the 23rd of May. At first the sick were placed in the two hospitals, but as the numbers increased two of the huts on the coast were for some time used, the other four being occupied by married families, four in each; but being found so very unhealthy, were after a time given up, and a small wooden building (attached to the hospitals, and formerly used as quarters for the Indian civil hospital attendants), a hospital marquee, and several bell tents substituted. In addition, at the main encampment, a tent was set apart with an orderly to look after it, and supplied with a few drugs. At this tent the morning sick were seen at 6 A.M., and convalescents at 11 A.M. Only such cases were sent to hospital as absolutely required it, the remainder being treated in camp. By this means the sick were saved the long walk to the hospitals, so the admissions to hospital must be at least doubled to give any idea of the amount of sickness. The loss of life was very great among the children, chiefly from want of proper food, such as milk, which could not be made up for by wine or brandy. They died principally from bowel affection. The dysentery which attacked us here was of a far worse form than the usual dysentery of Mauritius (for full account, *vide* Appendix I.), and the great difficulty we had to contend against was want of proper food, so important an element in the treatment of this disease. Latterly, bread was made by the men in the island, a welcome change to the stale, mouldy bread and hard biscuit which had hitherto been supplied. When the dysentery increased, it became evident to us that it would be far better to face the risk of relapses of fever at Port Louis, where proper food and comfort would be procurable, than to remain in Flat Island, especially seeing that the cool season had commenced, and consequently that the malaria was disappearing; and after urging this change as strongly as possible, the head-quarters returned by steamer to Port Louis.

The admissions to *hospital* during this time (30th March to 24th May) were, amongst the men, malarial fever, 292; dysentery, 49. Percentage of admissions: malarial fever, 76·54; dysentery, 12·84. But, with the exception of 20 men, all had had several attacks of fever, and *all* the women and children were ill with it or dysentery. The officers also suffered severely: one was invalided home from Flat Island, and two others on the arrival of headquarters in Port Louis. The most serious case was that of a young officer who had an attack of genuine enteric fever, complicated with occasional attacks of malarial fever.

The deaths were 10 men, viz.: 4 from malarial fever, 5 from dysentery, and 1 from ebriositas and malarial fever. Percentage of deaths: malarial fever 1·048; dysentery, 1·310.

One woman died from dysentery, and 13 children from dysentery and from asthenia after fever. Three men with dysentery were left behind, as they were too ill to move: one came to Port Louis shortly after, the second died at Flat Island, and the third in Port Louis after we had left for England, and are not included in the above death list. We may notice, in conclusion, that not one of the inhabitants had fever, except such as had been on the mainland.

Port Louis again.—From 23rd May to June 7, the health of the battalion rapidly improved, especially those whose state had been the most serious, viz., the dysenteric patients, so that for the week ending 7th June, of a strength of 645 men, there were 2 admissions for fever, and 9 remaining; *no* admissions for dysentery, and 22 remaining; while about 130 men were convalescents under treatment with quinine at the barracks. During this period (23rd May to 7th June) there were 8 admissions for malarial fever, and 12 for dysentery, and no deaths. Of these dysenteric cases, 3 were cases which occurred in last week in May in Port Louis detachment; the remaining 9 contracted the disease at Flat Island, but were not at once admitted.

The battalion embarked for home on board H.M.S. "Himalaya" on the 7th of June.

Before proceeding further with the history of the battalion it will be desirable to give a short account of those men of the regiment who were stationed at Cannonier's Point since 16th February, and at Port Louis during our stay at Flat Island.

Cannonier's Point Detachment.—From 16th February to 31st May the average strength was 164. The admissions were: 142 malarial fever, seven dysentery, and one diarrhœa; the percentage of admissions, 86·5 malarial fever, and 0·42 dysentery; the deaths were, two malarial fever, and one dysentery; percentage of deaths, 0·61 malarial fever, 1·22 dysentery. The greatest number of admissions for malarial fever occurred towards the end of April, and of dysentery, very end of April.

Port Louis Detachment.—From 30th March to 17th May, the average strength was 70·3. The admissions were: 78 malarial fever, and none of dysentery; percentage of admissions, 110·95 malarial fever and none from dysentery; the deaths were two from malarial fever; percentage of deaths 2·844 malarial fever.

Thus comparing the three stations of Port Louis, Cannonier's Point, and Flat Island for the seven weeks from 30th March to 17th May, we get the following:—

	Flat Island.		Cannonier's Paint.		Port Louis.	
	Percentage of		Percentage of		Percentage of	
	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
Malarial fever	75·03	1·068	53·80	0·4723	110·95	2·844
Dysentery	9·078	0·801	1·890	0·9446	..	..
Average strengths ..	374·5		211·7		70·3	

With regard to the above percentage of admissions it must be borne in mind that, owing to want of hospital accommodation at Flat Island, the percentage of admissions is much less than they would have been had all, as at Cannonier's Point and Port Louis, been admitted, indeed the percentage at Flat Island ought to be doubled.

On Board H.M.S. Himalaya.—From 8th June to 25th July, after a fine voyage, including stoppages at Algoa Bay, Simon's Bay, St. Vincent's, Madeira, and Queenstown, the battalion disembarked at Portland on the 24th and 25th July, four companies proceeding to Weymouth and the head-quarters to the Vern Citadel, Portland. The relapses of fever during the voyage were of course very frequent, and generally increased as the thermometer fell. The rations on board were excellent, and also the accommodation generally; but the sick bay was far too small, and the accommodation for sick women not very good, no close stools being allowed to be used; the women suffering from dysentery had to ascend a long flight of steps to the water-closet; this, however, was remedied after a time, the cabin for lying-in women having been given over to them.

The deaths in the battalion during the voyage were four men, two phthisis pulmonalis, aggravated or excited by repeated attacks of fever; one asthenia after fever, probably from embolism of heart; one suicide by drowning; two children, one malarial fever, and one dysentery. Much to our regret no *post mortems* could be held, as no possible place for such a purpose could be found on board the ship.

At Home from 26th July to 31st December, 1867.—Four full companies have during this time been stationed at Weymouth, where they are employed on engineering works, while the remainder, the head-quarters, have occupied the casemated barracks in the Vern Citadel on Portland Hill, where the duty entails a considerable exposure to cold, as there are a large number of men employed daily on picquet duty, the sentries being placed on very exposed situations to overlook the convicts at work.

The total number of relapses from fever among the men from 3rd August to 31st December, 1867, have been at Portland only 705.

The average daily number of relapses, 4·669; the daily percentage of relapses, 1·319; the average daily strength having been 352·81; officers at Portland have been 35; occurring in officers, 6; average strength of officers during period, 16·5; total number of relapses among women and children at Portland: 125 in 18 women, and 94 in 14 children.

Causes of Relapses.—Authorities on the subject have given a great many causes for relapses, but most of them seem rather of the *post hoc, ergo, propter hoc,* argument, and many seem very unaccountable, such as a heavy supper of lobster or crab being the cause of a fit of ague. From the 28th of August (and still being carried out) a series of meteorological observations have been made, viz., those derived from the wet and dry bulb, the maximum and minimum thermometers, so that the daily amount of humidity, the mean daily temperature, the highest and the lowest temperature in the 24 hours have been ascertained; with this a daily register of the number of fever relapses, calculated according to the strength of the regiment on that day; this has been necessary owing to the fluctuations in strength from men going on or returning from furlough. To give a few examples of the effects of a fall of temperature in increasing the number of relapses, we may select the following:—

On September 25th, the daily percentage of fever rose high; the temperature had fallen suddenly, and from being damp and warm, had become dry and cold.

On October 10th, with a fall of temperature, the percentage of relapses rose from 0·83 to 2·0 and 2·6 for a few days.

On November 17th and 18th, thermometer fell below freezing point, and percentage of fever relapses rose quickly.

On December 3rd, the temperature fell to 23° Fah., and this was followed by a great increase of fever cases.

The above examples are sufficient, we believe, to show that these observations have been accurately carried out day by day, and the general conclusions we draw from them are: 1st. That undoubtedly so far as we have carried

out these observations, *i.e.*, for a period of 151 days, the main cause of relapses of this fever, is a sudden fall of temperature. 2nd. That after the temperature has fallen and remained low, the relapses of fever fall to their usual number; in other words, that it is the effect on the body of a sudden fall of temperature which causes the relapses, and that if the temperature continues low, the number of relapses remains steady day by day, and about the same in number as when the temperature is warm. 3rd. That the amount of humidity or damp has no effect whatever on the relapses of fever; for we had numbers of thoroughly wet days with no increase of fever relapses, provided that the temperature remained steady; in other words, that what is called damp close weather, is unfavourable for causing relapses of fever.*

We venture to think these remarks are useful, as placing the causation of relapses of malarial fever, on the more certain basis of actual daily observation of those alterations of temperature which have so much effect on everyone. From our observations at Flat Island, we saw how powerful was exposure to fatigue and sun in causing the actual appearance of malarial disease in men who had been previously exposed to the influence of the poison, and now we find that the sudden fall of temperature has also a powerful influence in causing repetitions of those signs, of former exposure to malarial poison, which we call malarial fever.

In the detachment of the battalion stationed at Weymouth there are as many as 577 cases returned as relapses of fever "requiring quinine," out of an average strength of 189, *i.e.*, 2·0 per cent. daily (a much larger proportion than we show at Portland), as the men stationed at Weymouth have little or no night duty to perform (about 30 nights in bed), and the daily amount of fatigue performed on the engineer's works is not very hard; we can only conceive as the cause, that the doses of quinine were not, perhaps, sufficiently large and repeated to lengthen the interval between the relapses.

In concluding the history of the battalion, in relation to the dangerous malarial fever through which it passed, we may point out that since our arrival in England, the regiment has been performing a fair amount of hard work, as on the works at Weymouth, and guards and picquet duty at Portland; and that as a rule, and with few exceptions, no cases of relapses of fever have been actually taken into hospital, treatment with quinine for two or three days rendering them fit for their duty. A greater triumph altogether of actual curative medicine can scarcely be given than in the simple treatment which was adopted for a disease which carried off thousands of civilians, and which resulted in our bringing home this fine battalion with a loss of but few men, and with strength to perform the amount of duties they have been set to since their arrival in England.

IV. A General Account of the Fever.

In the following remarks all cases of fever, whether "continued," "intermittent," or "remittent," are classed together as malarial fever, of course not including any secondary fever, nor enteric or other determined specific fevers.

Symptoms.—Before speaking of the peculiar symptoms of the varieties of malarial fever, a few words on the more prominent signs of the fever generally are here given; they are founded on 396 cases, which were recorded regularly; afterwards the amount of work was too great to permit us to do more than take rough notes at the time of the most noteworthy circumstances.

Vomiting.—Out of the 396 recorded cases, in 132, or 33·33 per cent., vomiting was present, and in 264, or 66·66 per cent., vomiting was absent, and about the same proportion occurred subsequently: it was also remarked that certain men always vomited during the cold stage in all their attacks of fever while in others vomiting never took place; the matters vomited were the contents of the stomach; sometimes a little bile, but not much, or else dry retching, was only present.

* Up to the present date, viz., 1st July, 1868, these observations have been continuously carried out, and with the same result, viz., that a fall of temperature was always followed by an increase in the number of fever relapses; mere dampness having nothing to do with this result.

Condition of the Bowels.—Out of the 396 cases, 32, or 8·09 per cent., had looseness of bowels, while in 364, or 91·91 per cent., the bowels were regular, and in only a very few cases was there marked constipation.

Delirium occurred in very few cases indeed.

Cold Stage.—Out of 304 recorded cases, in 56, or 18·42 per cent., there was no cold stage, and in 248, or 81·58 per cent., it was present; but as the epidemic increased in severity, there were but few cases without a cold stage of some sort.

Varieties of Malarial Disease.

1. *Continued Malarial Fever* { A. Mild form. B. Severe form.
2. *Intermittent do.* do.
3. *Remittent do.* do., including the so-called "bilious remittent."
4. *Malarial Collapse.*
5. *Malarial Cachexy*, with the degeneration of tissues resulting.

1. *Continued Malarial Fever.* (Two varieties, viz., A mild, B severe, form).

A. *Mild Malarial Continued Fever:*—

Remarks.—We have already remarked on the greatly increased number of cases usually called "continued fever," or "febricula," which occurred at the commencement of the hot season of 1866-67, and which occurred later after cases of intermittent fever were plentiful; it seems, therefore, not unreasonable to suppose the same exciting cause, viz., malaria was at work in these cases as well; but that the symptoms were milder and less decided from the smaller amount of poison taken into the system, or rather from the fact that the malarial poison was at first of less intensity, and as we know that in very severe malarial fever no signs of intermission and remission may be present, so it seems a not unfair generalisation to suppose all cases of "febricula," such as occur in the unhealthy seasons of hot climates, to be due to a small dose of the same poison, which, in large doses, can completely prostrate as though by a blow, with a severe continued fever. This view coincides with Dr. Parkes's observation, that "when a climate is called unhealthy, in many cases it is simply meant that it is malarious."

Symptoms.—Those ordinarily observed in febricula, heat of skin, thirst, tongue but slightly furred, pains in limbs; its natural termination is in a profuse sweat on the 3rd, 4th, or 5th day. In three cases in which the temperature was taken there were nightly exacerbations till the highest point was reached, and then one sudden fall to the standard of health, on which convalescence was at once established; in such cases it would seem as though nature was able of herself to overcome or throw off the small dose of poison, so that no subsequent repetition of the attack took place till fresh exposure to the poison.

B. *Severe Continued Malarial Fever:*—

Remarks.—Very few marked cases of this dangerous form appeared in the battalion, but it occurred more frequently among the civil population; the attack is most usually sudden.

Symptoms.—No intermission nor remission, early delirium; tongue becoming very rapidly furred and dry, and feebleness of pulse commencing soon; vomiting is very generally present; this condition, if not at once relieved by large doses of quinine, passes into a state of coma, with dilated pupils, &c., and then death.

2. *Intermittent Malarial Fever:*—

Remarks.—The vast majority of cases of fever in the battalion was of this form, and the ordinary type was the *quotidian*, next in frequency the *tertian*, the *quartan* being very rare.

Symptoms exactly as laid down in books on the subject; the main symptoms have been already referred to at the commencement of the account of the fever.

3. *Remittent Malarial Fever:*—

Remarks.—Comparatively few cases of this form occurred in the battalion, and none until the head-quarters were sent to Flat Island, and there nearly all our cases appeared, and seeing there was no malaria present in Flat Island itself, its occurrence must be attributed to the effects of hard work and ex-

posure to the sun, with indifferent food, acting on men who had been exposed to the influence of malaria; this remittent fever, as also the "bilious remittent," are unfortunate terms, for most assuredly these terms were used very loosely, the former to mean a severe fever in which the three stages were confused or wanting; in fact, most were cases of the "severe continued malarial fever;" the latter we believe to be simply cases of malarial fever, in persons whose previous attacks had been neglected, or who had had many previous attacks of malaria in former years, and this form occurred especially amongst Indians and others who had of course been malarialized in their native land before coming to Mauritius; no such cases of excessive bilious vomiting occurred in the 13th Regiment. When it is stated that "remittent fever," or "bilious remittent fever" occurred largely in the civil population, little more information can be derived from these terms than, that amongst them, the fever was complicated by neglect, want of proper food, and especially of quinine, &c.; great numbers of those who were found dead in houses or elsewhere, died of what we shall present refer to, viz., "malarial collapse;" in other words, the word "remittent" did not, as it ought, refer to a fever with remissions instead of intermissions, but merely meant severe neglected fever arising from malaria.

The symptoms were so much the same as usually laid down, that it is unnecessary to take up space in describing them.

4. *Malarial Collapse*:—

Remarks.—By this term, we mean a state of profound anæmia, from the blood poisoning effects of malaria; the symptoms come on with little or no warning. A patient has had one or more attacks of malarial fever (the fever itself having not been necessarily severe); instead of convalescing as usual, the patient became weaker and unable to walk, and so on; the appetite might be fair; tongue was clean, though pale; in fact, no marked symptoms of any kind beyond a general debility and weakness; suddenly, after having, perhaps (though not at all as a rule) complained of slight cramping pains in the muscles of the legs, the patient apparently goes to sleep, and if observed shortly after is found in a state of profound coma, with pupils dilated (more or less widely, according to the length of time he may have been in this comatose condition) gently breathing in slight gasps (not stertorous) body and extremities cold, pulse weak, or not felt at all. The cases of this form which occurred in our regiment were of men, who having shown for some time no signs of fever itself, were not treated with quinine, as we were compelled for a short time to husband our stock of this drug while we were at Flat Island, and it was only there that such cases occurred; cases, however, such as these formed a very large, indeed the chief proportion of fatal cases amongst the civil population; men laid down, this coma came on them, no one near to give the full dose of quinine, death inevitably resulted; nature in such cases being powerless to heal, they passed slowly from this death like state of coma, without at any time regaining sense, into death itself; this form is quite distinct and far more deceptive than those cases of "severe continued malarial fever," which, however, if unchecked, pass through this stage of coma on the road to death. This form of collapse, not immediately following severe malarial fever, has been, as far as we can ascertain, not noticed prominently in such works on the subject as we have been able to consult, and as its recognition is of truly vital importance, it may be as well to dwell rather more in detail on it, and give such cases as occurred in the regiment when at Flat Island.

Case 1.—Private W. Travers, age 23, service 4 years, a healthy-looking young man who had had several slight attacks of ague in Port Louis (as was only found out after his death). He had been attending at the hospital tent in camp at Flat Island from 12th to 18th April, for a slight attack of ague, and was treated with arsenic; but though he lost the fever he got weaker, and was taken into hospital on the 18th. He had no return of fever while in hospital, and appeared to be doing well, but was very weak. He was treated with diuretics, and had 6 grains of quina given him on the 21st. On the morning of the next day he was insensible and comatose, having but half an hour before asked the orderly to rub his legs, as they felt a little cramped; then turned round as if to sleep. No one noticed his condition until at 7 A.M. (half an hour afterwards) when the Medical Officer found him cold and comatose, with dilated

pupils, and breathing in gentle puffs or gasps. Wine and brandy, &c., were given him, but no quinine; and he passed slowly away shortly after.

Sectio cadaveris, 6½ hours *post-mortem*.

Body, not notably emaciated; no congestion of body more than a little of the usual *post-mortem* congestion on posterior aspect.

Brain, some little blood in veins, but no effusion.

Spleen, four times its natural size; soft, pulpy, and full of blood.

Liver healthy, but dark-coloured.

Gall Bladder, full of dark but thin bile.

Stomach, somewhat slate-coloured.

Bladder, fairly full of light-coloured urine.

Lungs a very little *post-mortem* congestion at very bases, not full of air, and very bloodless generally.

Heart healthy; left side no blood, but a small, yellowish, translucent clot, which on pressure yielded yellow serum, leaving a very small amount of solid; right side, some thin currant-jelly-coloured blood, not clots.

Arteries (aorta, pulmonary, and femoral examined), quite empty of blood.

Veins, a little thin light-coloured blood.

Case 2.—Private David Lumsden, age 28, service 8 years, a strong healthy man, attacked at Flat Island on April 19 with intermittent fever. As the case seemed a mild one, he attended at the tent in camp, taking diuretics only. On the afternoon of the 23rd he was found lying insensible on the sea-shore close to the latrines. He was brought at once to hospital, when on arrival was found to be cold and pulseless, pupils dilated, breathing quietly in gasps, quite insensible, and a quantity of thin blood-stained fluid passed involuntarily per anum. Warm brandy and water was given at once, with a 20-grain dose of quinine, which was with difficulty got down. He gradually recovered, and was discharged well on May 2, having taken quina for a few days with stimulants, and subsequently iron.

Cases 3 *and* 4.—These two cases were exactly alike: they were of two men in hospital, convalescing from fever. As the Medical Officer was making his evening round at 9 P.M. he noticed two men in adjoining beds who seemed to be breathing somewhat unnaturally. The orderly and those near reported that they had been fairly well and cheerful all afternoon, and that they were now asleep. On attempting to wake them, however, they were found to be comatose, quite insensible, with dilated pupils and body cold. With some difficulty, 20 grains of quinine was put down the throat of each, a few drops at a time followed by brandy and water, ammonia, and in two hours after a second dose of quina (10 grains). Next morning these men were perfectly sensible, and made good recoveries.

Case 5.—A band boy was found two nights subsequently in exactly the same state, and was treated in the same way, but with rather less quina. He also made a good recovery.

The three last cases were men in hospital at the time, who had had no fever for some days, and complained of general bodily weakness, and were treated with acids, iron, and the like, but no quinine.

Summary of the five Cases.—The first case would in all probability have been saved if a large dose of quinine had been given him. It was the first case of the kind we had seen, and there having been no fever for some time, recourse was only had to general stimulants; but the result determined us to use quina in the next case, and with what successful results is shown by their recoveries, for undoubtedly had these men been treated otherwise they would have died in all probability by the morning, as was the case with thousands of Indians and Creoles during the epidemic. These cases have the following points in common, viz.:—

1. Weakness and prostration, without fever at the time.
2. Rapid subsidence into profound coma, without any warning.
3. All had been treated for some time without quinine.
4. The main symptoms were the same, viz., coldness of body, dilated pupils, and coma, *i.e.*, no marked lesion indicated, but merely weakness and prostration.

The four treated with quinine and stimulants recovered well; the one treated with stimulants and no quinine died.

Amongst the officers, two young ensigns—one at Port Louis, and one at Flat Island—showed the same state. They were invalided home, and eventually did well, but for a time they were in great danger. Quinine was given in full doses.

Diagnosis.—This "malarial collapse," we think, is to be distinguished from the "severe continued malarial fever," which, if fatal, shows a somewhat similar termination, as far as symptoms go; but in pure "malarial collapse" there is wanting such signs as foul, dry tongue, sordes on lips, &c. It is easily separable from "insolatio" by state of skin and pupils; and we wish to separate it from the following malarial disease, "malarial cachexy," in that none of the great alterations of texture of liver, spleen, &c., have as yet occurred.

5. *Malarial Cachexy.*—Most of the men were not sufficiently long exposed to the malarial poisoning to show this to a very marked extent, beyond the usual relapses of fever and general anæmic condition. They were removed from its influence in time for the enlarged spleen to return to its healthy size, without permanent enlargement and hardening, and without serious and permanent damage to any of the various organs or tissues of the body.

Pathology.—Before proceeding to make any remarks on this subject, it will be best to give a short account of such fatal cases, in addition to those already given, which were in any way attributable to malarial fever. The fatal cases from other causes, as dysentery, enteric fever, &c., will be given hereafter.

Case 6.—Private Joseph Clarke, aged 38, service 8 years, a steady dram-drinker, had been drinking very hard for some time, and was a prisoner for being drunk. No signs of fever on him when seen 1st April, 1867, while on passage by steamer to Flat Island. Before landing, however, he was seized with fever, became delirious, trying to throw himself overboard. After landing he became comatose, and died three days after, *i.e.*, 4th April.

Sectio cadaveris, 2 hours *post mortem*.

Liver, markedly cirrhosed, dark-coloured.

Gall Bladder, full of somewhat inspissated dark bile.

Spleen, twice natural size, rather pulpy.

Brain and other organs healthy.

Case 7.—Private J. Stride, aged 30, service 8 years, a man who had suffered terribly from syphilis, constantly having small secondary sores on neck, papular eruptions, &c., was seized with fever, and died in five days.

Sectio cadaveris, 3 hours *post mortem*.

Spleen, five times its natural size, and very pulpy.

Stomach, a good deal conjested.

Liver, enlarged, dark, several crucial deep cicatrices (syphilitic) on upper surface of right lobe, grouped together.

Gall Bladder, full of dark bile, thick, with fine solid particles.

Case 8.—Private J. Dempster, age 36, service 8 years, a man who had often suffered from dysentery, and came to Flat Island still under treatment for it, was seized with fever, and died comatose in 38 hours.

Sectio cadaveris, 4 hours *p st mortem*.

Body, a good deal emaciated.

Spleen, three times natural size, pulpy.

Stomach, somewhat conjested.

Between *liver and diaphragm* and *spleen and diaphragm* was found some soft, yellow, adhesive matter containing pus, about an ounce altogether; no signs of peritonitis existing.

Heart, a large, firm, fibrin clot in left ventricle and aorta.

Large intestines somewhat thickened, especially near the ileo-cœcal valve, but no ulceration.

Case 9.—Private W. Hawkins, aged 30, service 9 years, had a sharp attack of malarial fever, and recovered apparently well from it; but while still in hospital on 17th April, he got suddenly weaker with œdema of right fore-arm and left foot. He stated that he made urine more freely than usual (no time to examine urine); he died unexpectedly on the night of 24th April.

Sectio cadaveris, 10½ hours *post-mortem*.

Body, much subcutaneous fat about 1½ inches in thickness.

Liver, healthy, not dark.

Stomach, no conjestion at all.

Spleen,-three times natural size, not markedly soft or pulpy.

Kidneys. very flabby, enlarged, granular, and in both small abscesses.

Ureters,-both enlarged and left bifurcated at a short distance from the pilum, and entered kidney at a separate place, and then joined the other at the pelvis of gland.

Heart, Left ventricle, firm fibrine clot; right ventricle, soft black clot; no fluid in pericardium.

Lungs, very little congested, even at bases; both full of frothy liquid; no fluid in pleura.

The main point in the pathology of this disease, is that the blood is poisoned, all subsequent complications or impairments arising from the action of this depraved fluid on the tissue and organs of the body. It seems to have been too much the custom to look upon the spleen and certain organs as being the most affected, it being rather a very prominent lesion; but the pains in the limbs, and general muscular weakness, and a sort of fatuity which follows a severe attack of the fever, all point to impaired function, and probably temporary impaired structure of all the organs and tissues, and consequently to lay too much stress on the treatment of one prominent organ, as the liver, is not sound pathology, as in the case of this fever we have an agent in quinine, which has the power of remedying the depraved state of the blood induced by the malarial poison, and practically this is found to be the case, for the quinine will clean the foul tongue, give strength to the muscles, and prevent the bilious vomiting, without having recourse to remedies such as calomel and the like, which after all, when given, can only carry one outwork of the disease, instead of destroying the main citadel itself, for it must be remembered that we have to do with a disease for which we have a potent and conquering weapon in quinine, and consequently merely to treat prominent symptoms is useless; the case being very different from other diseases where we can only treat the symptoms as each arises.

In discussing the pathology of this fever, we must separate two very different states, viz., (1) cases of death during an attack of fever, and (2) those cases which we have called "malarial collapse."

1. In cases of death during the fever, there is more or less general congestion.

2. In deaths from malarial collapse, as well shown in case 1, we find an absence of blood from the arterial system, and an airless state of the lungs, which are also remarkably bloodless, a condition of profound anæmia exists, the spleen only being gorged more or less with blood. These few signs distinguish the form of the disease, viz., "malarial collapse" from death during the fever, or when the patient is as it were knocked down by it as though by a sudden blow, just as much as do the symptoms during life. It is worthy of note, that in these two very opposite conditions quinine is equally useful; at the risk of being tedious, we feel inclined to dwell on this form of malarial disease, viz., the collapse without fever, on account of the first death having made a profound and painful impression, while the extraordinary manner in which in the subsequent cases the men were literally snatched from the jaws of death. To a person who had never seen such cases of coma from malaria, it would seem almost miraculous to observe the effects of a few grains of quinine. Again, as far as we have been able to consult authorities, this form is not noticed, and our first case completely baffled us, as from the length of time that had elapsed since the last attack of fever, and with the coldness of the body, it did not in the least resemble any form of malarial disease with which we were acquainted personally or through books. This form again is very distinct from malarial cachexy, where death ensues from profound degeneration of various organs, whose healthy condition is necessary for the continuance of life. It seems to us a mistake to look upon one organ as being more attacked by the actual disease than another, but that rather certain organs show the effects of the poison more, thus though vomiting is a very prominent symptom, yet its presence shows nothing more than the pains in the back and limbs, both are due to the same cause, viz., the circulation of a vitiated fluid in the place of life-renewing healthy blood, and the long continued circulation of this fluid leads to changes in the structures of the body which we find in a person suffering from "malarial cachexy." John Hunter

says emphatically "that fatal yellow fever is the death of the blood," so we seem in malarious diseases to have all stages of poisoning up to the death of the blood as seen in "malarial collapse."

Bilious Remittent.—No cases of this vaguely termed disease occured in the 13th, and unless we resort to the supposition that the same cause, viz., malaria in the same town, nay, even in the same street, gave origin to intermittent fever in one case, and to bilious remittent in another, we can only, and we think best, explain the occurrence of this form by separating it entirely from the direct effects of malaria, and attributing it to the result of previous attacks of malaria, *i.e.*, that such symptoms as excessive bilious vomiting, even going as far as blood vomiting, were a complication mixed up with the fever proper, but distinct from it, in other words, occurred only in a person thoroughly malarialized, who was seized with a fresh attack or relapse of fever, a person too whose previous attacks have probably not been treated with quinine. It is only in this way that the discrepant opinions which existed in Mauritius, as to the relative proportions of the different kinds of malarial fevers can be explained, and this form of bilious remittent was seen more specially amongst people whose native land is malarious, such as Indians and others. In very many cases the severity of the disease depended evidently on the question as to how the prior attacks had been treated, whether quinine had been given in sufficient quantity or not, whether mercurialization or blood-letting had been employed or not, whether depressing or stimulant remedies had been used or not. We write this advisedly, as there were some who ignored quinine altogether, some who declared that in *small* doses it answered as well, some who mercurialized and even bled. In conclusion we may state that our short observations, taken at a time of very great pressure of work coupled with illness, only confirm what has been far more ably described before. The chief point we would refer to especially, is that dangerous form which we have called "*malarial collapse*," which apparently hitherto has not been so strictly defined as it might be, and above all the value of the simple quina treatment has been markedly shown in the great experiment which we witnessed when this battalion of young soldiers was for the first time exposed to the full effects of the malarial poison.

The object of our remarks on the pathology of this disease, is to, if possible, strengthen the views of those eminent men who have insisted on the proper method of cure, viz., to attack the disease, *i.e.*, the poisoned blood, and not to waste time in trying to treat the secondary symptoms only, such as the derangement of function of liver, stomach, &c., and yet, from what we saw in Mauritius, this latter method was pursued by not a few, who consequently must have ignored the sound pathology of the disease in spite of the lessons taught by the great physicians of India.

Treatment.—Beyond the use of diuretics and diaphoretics, *quina* was almost the only drug used, no leeches, no bleeding, no mercury, in fact the treatment so ably and energetically laid down by Deputy Inspector-General Maclean, of Netley Hospital, and most satisfactory was the issue, for out of a strength at Flat Island of 374·5 only four men died of the fever, and most certainly one of these four, if not another, would have been saved had he been treated with quinine, and this small mortality in spite of fatigue and hardships at Flat Island, and in spite of the supply of quina being at one time so small, that it was not given to any, except the most urgent cases. If the fever was "severe continued malarial fever," the quina was given at once without waiting for any remission, and given in good time. At the commencement of the epidemic, the dose of quinine was some 6 to 9 grains daily, afterwards 12 to 18, and finally in England it became necessary to give as much as 40 grains to stop the next accession of the ague fit; it was given as a rule in pills of 3 grains each, which had the advantage of being very portable, and, moreover, were better borne in cases with vomiting than the quinine in solution was. *Arsenic* was used rather extensively at Flat Island, but though undoubtedly useful, it could not for a moment be compared with quina, and owing to the amount of intestinal complication, it was found advisable to cease using it. As a rule an *emetic* was not given; even when a patient complained of nausea with a sense of weight at the epigastrium, and seeing that this sensation was due to the same agent which caused the headache and pain in the back and limbs, it is

difficult to see why the one should be treated and not the others, and this nausea, and even vomiting, generally ceased as soon as the hot stage had well set in. To prevent vomiting, for the most useful and successful remedy, was the *nitrate of bismuth in* 10-*grain doses*, various other remedies against the vomiting were tried but none succeeded so well as this one; *a purge* was seldom given, and certainly not as a matter of routine: our experience did not show that it was at all a necessary preliminary to "clear out the primæ viæ" before giving the quinine.

Mercury was not once used, except occasionally some calomel as a purge, and our results and experience satisfactorily show this drug is not at all required; even the liver may seem to be a little disordered, with tongue foul, yet we found that the quina, acting against the noxious causes of all the mischief, cleared the tongue, and set the liver all right, as well as put a stop to the next fit of ague. Comparing the mortality of the regiment with the immense mortality of the civil population, we think no greater proof could be given of rational and good treatment, though no doubt the attendance and good diet went a long way in Port Louis, to cause this difference; but it must be remembered that the deaths amongst those in easy circumstances, were far greater than amongst the soldiers.

We found the previously-observed fact to be the case in this epidemic, that if no quina were given for a fit of ague, the next fit came on at an earlier hour than the previous one, and that also the reverse was the case if quina were given. The *liq. quinoidine* of Savory and Moore was tried in England, but by no means replaced quina as a preventative of the next fit of ague; moreover, it was very apt to cause vomiting. *Cinchoniæ disulph.* was also used, but it required far larger doses than of quina to stop a paroxysm, and even then its action could not thoroughly be relied on.

General Remarks on Points of Interest connected with the Fever.

Numbers of Non-Commissioned Officers and Men who escaped the Fever.—Thirty-six, or 5·307 per cent. Two of the men had ague for the first time since, and some time after, their arrival in England, reducing these figures to 34, or 5·07 per cent.; of commissioned officers, 7, or 25 per cent., escaped; no marked characters as to strength of body or general health, to account at all for their escaping. *Yellowness of skin* was only marked in one case, and slightly in one other.

Diuresis, as a sequel to, or during the fever, occurred in one case only.

The Fever not Contagious.—It may seem strange that a fever whose general non-contagious character is so well known, should have been called contagious by any one; yet such was gravely set forth by a medical practitioner in the island, in a series of letters to a local journal. We are not aware, however, of any other practitioner in Mauritius holding like opinions—two perfect proofs of its being non-contagious were fortunately afforded in the regiment, viz.:—

1st. At Flat Island none of the whites and blacks there resident contracted the fever during the six weeks that the regiment was there stationed, though they mixed much with the regiment, of course excepting those who had visited Mauritius during the time of the epidemic; and,

2nd. No sailor on board the "Himalaya" had an attack of the fever during our passage home.

These are ample proofs of the utterly non-contagious character of the fever.

Period of Incubation.—The length of time during which the malaria may lie latent in the system without manifesting itself by fever seems to depend in very many cases on external conditions; thus most of the men and officers composing the head-quarters of the regiment had had no fever till after their arrival at Flat Island, and then, from exposure to sun and great fatigue, numbers of them were struck down soon after with fever; indeed, far more were attacked with fever in a short time than had been the case in Port Louis itself, where the amount of duty and work was very slight. That the period of incubation may be long is seen in the case of two of the 36 men who escaped the fever; these two men have had each a thorough attack of intermittent fever

during the cold weather in England; in one about five months after leaving Mauritius, and the other six months after.

Causes of Relapses of Fever.—We have just seen that on the arrival of head-quarters at Flat Island, that a large number of men who had been exposed to malaria in Port Louis were at once struck down with fever, and comparing the differences in their manner of life at the two places (and remembering that there was *no malaria in Flat Island*) we are literally bound to the conclusion that while they had very little work and no exposure to sun, &c., at Port Louis, though in a malarious place, they had been able to resist its effects; but that the exposure to sun and great fatigues and other lowering conditions which they encountered at Flat Island, had the effect of bringing out the fever. We have also seen that, in England, the condition which brought on a fresh attack of fever was a sudden fall of temperature; hence it would seem that any conditions which for the time lower the system, or reduce, so to say, its vital power, have a tendency to bring on a relapse of the fever. Perhaps these observed facts may help to explain the discrepancies which exist as to the height to which malarial poison may be carried, for it would be quite possible for a body of men to be exposed in a low-lying country to malaria, and yet on arrival at higher level and cooler atmosphere to be attacked far more generally with malaria than they had been in the lower level. These facts also unfortunately render it very difficult to determine whether malaria has ceased to be evolved in any place, thus, shortly before our embarkation from Port Louis, several undoubted fresh cases of fever occurred in people who had not had the fever; but this was no proof that malaria existed still, for the weather had become markedly cool after having been very hot, and individuals who had passed untouched through the fever epidemic, when exposed to this great change of temperature showed symptoms of fever, just as relapses occurred in England, when there was a considerable fall of temperature, so that we are forced to the general conclusion that, given a person who has imbibed the malarial poison, his first attack of fever, or relapse after his first attack, may be (or generally is) brought on by some cause or causes which reduce his general vital energy, or causes which produce a certain lowering effect, or small shock to his nervous system.

Causes of the large Proportion of Deaths among the Civil Population.—We believe that we have shown that all people alike were attacked by the same disease, and that we must look for the excessive civil mortality to some other cause than the virulence of the disease itself; and there can be little doubt that it was due to the want of proper attendance, and, above all, to the want of quinine. A very large number of those found dead in their huts or in the streets and fields, or were found and brought in in a dying state, were suffering from what we have named "malaria collapse," *i.e.*, they were people who had been thoroughly saturated with malaria, and had had no treatment, besides being in want of the common necessaries of life. This is a most important point in every way, for in future epidemics with a good store of quinine in the island, and a regular system of relief, a comparatively small death-rate will result, it being a very different case from an epidemic of cholera or yellow fever, over which we have no curative remedies; *i.e.*, it is only in this way that we can account for the enormously disproportionate number of deaths in the civil and military population, unless we revert to the out-of-the-way theory that the same poison acted differently on the military and civilians. In a letter from Dr. Charsley, the Principal Civil Medical Officer of Ceylon, he stated that on being applied to by Government on the question of putting vessels from Mauritius into quarantine, as the result of his examinations of the crews of vessels from Mauritius, he found all the cases were "neglected intermittent, drifting into the remittent, low, typhoid type," and, consequently, that no quarantine was necessary. This opinion of a gentleman thoroughly well versed on all the forms of malarial disease perfectly tallies with our own, viz., *that the fatality of the disease was not due to its inherent, dangerous nature, but the want of proper medicine and attendance.* We may safely predict that with a good stock of quina no such fatal epidemic can again occur, provided that the quinine is given freely and without fear; for we heard in Mauritius of such bugbears given out, and that, too, by medical men, that quina in large doses caused dysentery and other internal complications; and

one gentleman asserted, in the face of the fearful mortality amongst his own patients, that a few grains of quinine were quite sufficient, without resorting to large doses.

Existence of Malarial Fever prior to 1866-67.—This is a somewhat difficult point to settle, as what is called "Bombay fever" in Mauritius (a bilious remittent fever) occurs almost entirely amongst a people who had been subject to malaria in their native land, and consequently relapses occurring amongst them might be due to mere effects of fall of temperature and the like. It is, however, certain that occasionally a few cases of genuine intermittent fever occurred in past years in the hot season, but to a very inconsiderable extent, at the same time, from the general non-recognition of true "enteric fever," numbers of this fever were put down as "Bombay fever" or "continued fever," and seeing the mode of life in Indian settlements in Mauritius, it would afford most excellent opportunities for a spread of "enteric fever."

Influence of Elevation in relation to Malarial Fever.—The well known fact that elevation gives a certain amount of immunity from or lessens the danger of the influence of malaria was well shown in the detachment 2nd Battalion 22nd Regiment, stationed on the small height in Port Louis, called the Citadel, or Fort Adelaide, and though the barracks here are casemates, and very close and badly ventilated, yet the men resisted the malarial influence for nearly two months, during which time the fever was raging in the town itself, and amongst the troops in the Line Barracks. In this case, the fact of their spending the night high above the level ground seems to have preserved them for long from the malaria, and this accords with the general experience that it is at night or in the early morning that men are most liable to be attacked by fevers and the like, and this seems to tally with the fact that on first rising in the morning in hot climates the temperature of the human body is at its lowest point (we have found in Mauritius by experiments on ourselves, the truth of this fact observed by Dr. John Davy, in the West Indies), consequently we can well understand that at this time the body has less resisting power against malarial or any other poison.

After Effects of the Fever, i.e., other diseases than mere relapses, which could in any way be attributed to the results of the malarial fever.

Phthisis Pulmonalis.—One case of this disease occurring after the fever, died on passage home, and second was discharged the service for chronic hepatitis, who died at the Military Hospital, Portsmouth, and *post-mortem* was found, besides a very large liver, tubercles scattered throughout both lungs.

A third case of phthisis pulmonalis, after fever and dysentery, was discharged the service at home, the disease having come on after malarial fever and dysentery.

A fourth case, with hepatitis, discharged the service at home.

These are all the cases of phthisis which occurred in the regiment in men who had not the disease before the outbreak of fever.

Hepatitis, 1st.—The case above mentioned who had tubercle of lungs.

Hepatitis, 2nd.—Of a man who had tubercle of lungs, as well as hepatitis, discharged the service at home for chronic hepatitis, probably a form of cirrhosis, being a great drunkard.

No cases have occurred which could be attributed to the effects of the fever.

Asthenia.—Case already mentioned of a man who died on board ship, on passage home. Unfortunately no *post-mortem* could be made, and his symptoms were very obscure.

Kidney Disease, 1st.—One case has already been given (Private Hawkins), who died in Flat Island. Probably he had had chronic Bright's disease, for some time before, and the fever was not the cause of the disease, though it hastened his end.

2nd.—A case of a serjeant, who died on 23rd November, 1867, of double pleurisy and kidney disease, at Weymouth. He had repeated attacks of ague, more so perhaps than any other man, but he generally convalesced from them very rapidly. The *post-mortem* signs were—Body with much fat under skin (as in the case of Private Hawkins, given before), both lungs universally and firmly adherent, and full of frothy fluid; liver very tough and hard; spleen nearly natural in size; right kidney very pale and mottled, internally, so much so that it was quite white in parts, the whole of pale colour; and the distinction between

the pyramids lost; under microscope, chiefly inflammatory products seen, *i.e.*, cells of various shapes and granules, with some fatty degeneration; left kidney completely converted into a series of seven or eight cysts, containing white creamy matter; no pus.

It would be dangerous to attempt to found any decided inference as to cause and effect of malarial fever in kidney disease on these two cases only, and as no other cases have been seen amongst the men, it would seem to be probably accidental.

In conclusion, we would say that except phthisis pulmonalis no disease as yet has been seen by us amongst the men whose origin we could attribute to malaria.

Relapses of Fever amongst the Officers.—Four of the officers have left the battalion, of these three had the fever; two others have been on sick leave all the time, consequently no certain data of the relapses of fever can be given amongst the officers; suffice it to say that all except one have had relapses since their arrival at home; none of those who escaped the fever abroad have had attacks at home.

On the Fever as it occurred amongst the Women and Children.—No woman or child escaped the fever, the children especially had relapses after relapses, and though so many died at Flat Island, it was astonishing that more did not perish.

Women.—Deaths two. (1). One woman died at Flat Island of dysentery, a chronic case. (2). One died at home, a few days after landing, of dysentery, having had many attacks of fever.

Children.—20 died in all. One in January, 1867, at Port Louis, of dysentery; one in February, 1867, at Port Louis of dysentery; one in March, 1867, of feb. malaria at Port Louis; thirteen at Flat Island, from 1st April to 23rd May, 1867, of dysentery or fever, or both, but chiefly from want of proper nourishment; one in Port Louis of chronic dysentery on 31st May, 1867; two on passage home in June, 1867, of fever and dysentery; one in England in July from asthenia after fever and dysentery.

From this statement it will be seen that up to 31st March, 1867, though fever was killing thousands of civilians, only one baby died of it, and that it was only at Flat Island, and shortly after, that any serious loss occurred, which was easily explained by the want of milk, eggs, good bread, and the like. The strength of women and children when the regiment went to Flat Island was 40 women, of whom one died at Flat Island, and one at home; 70 children, of whom 16 died at Flat Island, or soon after, and one died at home.

On the use of Sulphur and Hyposulphite of Soda in Malarial Fever.—In pursuance of an Order, dated 24th October, 1867, from the Director-General, Army Medical Department, a certain number of men were placed under this sulphur treatment, viz.:—

1. Corporal M. Serriner, age 30, in hospital with gonorrhœa and suppurating bubo.

November 3rd. Fit of ague.

4th. Take soda hyposulph., grains 30, at 9 A.M. and 12 A.M.

5th. No fever yesterday. Take soda hyposulph., grains 30, *ter in dies.*

6th. Ague fit yesterday. Continue soda hyposulph., *ter in dies.*

7th. Fever yesterday. Continue soda hyposulph.

8th. Ague fit this morning. As the last attack was very severe, and the man was pulled down, the soda hyposulph. was stopped, and he was put on full doses of quina, which stopped the relapse. In this case the hyposulph. of soda was quite useless.

Case 2.—Boy Troupe, age 17. This boy had had very many attacks of ague.

October 21st. An ague attack. Treated for two days by quinine, and after ferri et quina citrat.

27th. Put on 30 grains of sulphur three times a-day, and took it continuously till 28th November, when he had an attack of ague. Took quina, grains 36.

29th. Take quina, grains 12.

30. Put on soda hyposulph., grains 25, *ter in dies*, and took it 27th December, 1867.

January 1st, 1868. Had relapse of ague. Treated with quina, as it was evident that the sulphur and soda hyposulph. did not stop the attacks.

Case 3.—Boy Isaiah Webb, age 15.

November 19th. Had ague fit.

20th. Quina, grains 38.

21st. Ferri et quina cit.

27th. Sulphur, grains 30, *ter in dies*, and took this for a month.

December 24th. Had an ague fit in spite of all the sulphur he had taken.

Case 4.—Private A. Mathews, age 28.

October 27, 1867. Has had four relapses of ague, the present one being fourth. Take sulphur, grains 30, *ter in dies*.

28th. Fever again this morning. Continue sulphur.

29th. Fever again this morning. Sulphur this morning, but as he is getting weak and feeble, is put on quina—viz., grains 18, at 2 P.M. and 8 P.M.

30th. No fever, Quina, grains 6, at 10 and 12 A.M.

November 1st. No fever. Continue sulphur.

6th. Has been taking sulphur three times a-day; discharged well.

Case 5.—Private J. Cusack, age 17.

November 6th, 1867. Attack of ague. Take soda hyposulph., grains 30, *ter in dies*.

9th. Has had ague each day, and last attack very severe. Omit hyposulph. soda. Take quina, grains 18, at 2 P.M., and hyposulph. soda.

10th. No fever. Quina, grains 3, *ter in dies*.

11th. No fever. Quina, grains 3.

Case 6.—Private Parker.

November 9th, 1867. Attack of ague. Take soda hyposulph., grains 60, *ter in dies*.

10th. No fever. Soda hyposulph., grains 60, four times a-day.

11th. Took one 60-grain dose of soda hyposulph., and soon after a fit of ague came on.

12th. Quina, grains 18, at 9 A.M. and 12 A.M.

13th. No fever. Quina, grains 18.

14th. No fever. Quina, grains 12.

Here, again, the use of these medicines seems to have been of no value in preventing or stopping the ague fit. Accompanying the document from the Army Medical Department, was an extract from the "Commercial Gazette of Mauritius," in which Dr. Schmidt gave his opinion on the use of sulphur and the hyposulphites, acting on a suggestion of Deputy Inspector-General F. Reid, this paper went to prove that the fever was cured, and relapses prevented by the use of these medicines. It also went so far as to explain their action in the prevention and cure of malarial disease, and finally ended with an account of the action of quina, which, according to the author, acted only by its astringent or "withering" qualities. As a matter of fact we examined several simple unicellular plants, similar to those which Dr. Schmidt found on and in all the bodies of patients suffering from malarial fever, and exposed them under the microscope to the action of a strong solution of hyposulphite of soda, but no perceptible result followed. It is to be regretted that Dr. Schmidt did not adopt this simple plan of testing the powers of the drug on the low vegetations which he describes as occurring only in people suffering from malarial fever. This gentleman's hypothetical description of the action of quinine in curing malaria was of a very simple description, but as it went to show that quina acts by a process of astringency, which he takes as synonymous with withering, we may with good reason have been sceptical as to the value of sulphur and its compounds; and in the few cases in which we employed it, our scepticism was amply borne out. It was so evident, that having made up his mind on the hypothetical action of sulphur and its compounds on these unicellular plants, that Dr. Schmidt tried to twist the action of quinine into a similar process, but it is quite certain that no process of withering, and so destroying the parasite plants, can explain its action, especially in thos ecases of "malarial collapse." From its influence in these cases, and the diminishing the size of the spleen, it is evident that the main action of quina is on the blood. To call quina simply an antiperiodic is no explanation of its action, and that it is an absolute cure for malarial disease is again not exactly the

case, for it stops the "continued" form of malarial fever, just as well as the "intermittent" or "remittent" form but only for a time; but whether it acts directly on the blood, or on the nerve elements of the blood vessels, is uncertain; but undoubtedly its action is on the circulation of the blood in some way or other.

V. ADDENDUM.

The Dysentery.—Before referring more especially to the peculiar form of dysentery, which attacked the regiment at Flat Island, a few remarks on the ordinary acute dysentery of Mauritius are given as preface.

Causation.—Whatever may be the predisposing causes of dysentery, the exciting cause is always a sudden change from warm to cold weather, especially if with rain and high winds; and as a rule in Mauritius the dysentery occurred in small epidemics, there always being a certain number of men attacked about the same time; towards the end of the hot season when the S.E. winds begin with rainy chilly weather, dysentery prevails. As to predisposing causes, whatever tends to bring the health below par, undoubtedly also conduces to liability of being attacked by dysentery, hence the number of predisposing causes must be numerous: in the annual report of 1866, this subject is referred to, and the almost total absence of cases of dysentery amongst the officers, was stated as probably due to their better feeding, or, in other words, that the diet of the men was not sufficient, and consequently a below par state of health prevailed among them.

The symptoms of the ordinary dysentery of Mauritius are much the same as usually described; the treatment is very satisfactory by large doses of ipecacuanha.

The Dysentery at Flat Island.

Symptoms.—Briefly to characterise this form, the stools were simply of thin, smoky, dark fluid (of disintegrated blood and water); no sloughs (until some time after commencement of the disease, and not necessarily then), with no trace of feculent, nor indeed of any solid matter; great depression of patient's powers, and tendency to coldness of body, but mind quite clear; after death the signs were total sloughing of whole of internal coats of large intestine, or merely a prominent state of all the glands; there were some cases at the time of the ordinary dysentery, with its mucous slimy stools and ulcers of the large intestine.

The first case occurred on 23rd April, when the end of the hot season was marked by strong cool S.E. gales, with occasional showers of rain, a great change after the hot sultry weather which had prevailed for so long, and a very large number of men began to be attacked by bowel complaint (a certain number of the cases will be given hereafter). The first fatal case terminated in 6 days; ipecacuanha was of no avail, it caused excessive vomiting, and so our main, nay, almost sole weapon was useless; after making the *post-mortem* of this case, the idea came (how or why, one cannot say) of using *very large doses of tinct. ferri perchlor.*; this was adopted, and succeeded admirably.

Pathology.—As in the case of the fever, we give a series of cases first.

Case 1.—Private James Wilson, age 29, service eight years.

Symptoms.—From 9th April to 13th April treated out of hospital for an attack of malarial fever, but admitted, as he did not improve; on 22nd April was seized with profuse dysenteric diarrhœa, stools being merely dark fluid, not a particle of feculent matter and no sloughs; it resisted all treatment, including ipecac.; he died with body quite cold, but mind clear, on 29th April.

Sectio cadaveris, 19 hours *post-mortem*.

Body, very much emaciated and shrivelled.

Liver, healthy; on upper surface of right lobe a deep linear scar (no history of syphilis).

Lungs, healthy, but little congestion even at bases.

Heart, blood on both sides; no clots.

Kidneys and *brain*, healthy.

Spleen, a little larger than natural.

Small intestines, healthy.

Omentum, attached on left side to brim of pelvis, on right side by its edge to side of abdominal wall.

Large intestine, adhesions to liver, spleen, kidneys, psoas muscles, and wall of abdomen, and on detaching it, gut gave way; along whole canal, lying in centre, a thick soddened slough of internal and middle coats, external intestinal coats being left quite clean, and gut looked very thin; this slough extends from ileo-cæcal valve to anus, the smell only rather offensive; slough in squeezing yielded a quantity of dirty-water like fluid.

Case 2.—Private F. Arnold, age 27, service 8 years.

Symptoms.—A strong, healthy young man, who had not had the slightest signs of fever or malarial disease, on 9th May attacked with same sort of dysentery as last case, with passage of great quantities of dark, thin non-feculent fluid, died 15th May, with all the symptoms same as last case; features became pinched, and voice very husky.

Took ipecac., sulphuric acid and tinct. ferri perchlor. (but not in very large doses).

Sectio cadaveris.—Right side of heart and veins full of dark-coloured fluid blood, and in left ventricle a firm white clot.

Lungs, a little congestion at very bases.

Spleen, rather smaller than usual.

Brain, healthy, but good deal of blood in veins.

Liver, healthy, but sinuses full of blood.

Kidneys, healthy.

Small intestines, quite healthy, contained a small quantity of stuff like finely-chopped spinach.

Large intestine (beginning sharply at ileo-cæcal valve), thickened throughout, not thinned anywhere, no ulcers, but patches of dark-coloured, rather soft material (stained by iron he took), mucous coat had almost disappeared, and muscular coat was softened and exposed.

Omentum and *intestines*, externally looked rather rosy red, about one pint of thin blood-stained fluid in peritoneal cavity, no lymph, &c.

Case 3.—Private P. Mountjoy, age 27, service 8 years.

Symptoms.—Admitted 3rd May, for attack of malarial fever, convalesced well, but on 16th May, while in hospital, seized with passage of an enormous amount of thin fluid stools, and on the 19th vomiting, as well as purging; he died suddenly on 20th May, features being very pinched and body very cold, but at time of death, and for some hours after death, body got warmer; the vomit and stools were like rice-water, but stools were dark at first.

Sectio cadaveris, 24 hours *post-mortem*.

Brain, not examined.

Heart, rather large, gelatinous white fibrin clot on left ventricle: the same, but not so large nor loose, and darker-coloured, in right ventricle.

Gall bladder, full of thin bile.

Large intestine, no very evident lesion, beyond softening of internal coat and all glands very prominent and distended, the gut quite pale.

Small intestine, very pale, glands all enlarged, which made it, especially the upper part, look rough, from prominence of glands; both it and large intestine full of milky white, thin fluid, with fine flocculi floating in it; no appearance of bile in intestines.

Mesenteric glands, somewhat enlarged.

Lungs, *liver*, and *kidneys*, no naked eye lesions, and no noticeable congestion.

Spleen, about one-quarter too large.

Case 4.—Private George Alwin, age 27, service 8 years.

Symptoms.—I[redacted] and convalescent from malarial fever, on 30th April profuse stools, [redacted] straining of dark, watery fluid; acid sulphuric given 1st May. Tinct. ferri perchlor., 120 m. to be taken to-day.

May 2.—Stools nearly well; took 60 m. tinct. ferri perchlor.

May 3.—Well; ferri et quinæ cit., *ter in dies*.

May 11.—Discharged well.

Case 5.—Private James Glover, age 26, service 8 years.

Symptoms.—While in hospital for malarial fever was attacked, 19th April, with dysentery, with profuse stools of blood and water. At first used large doses of ipecac., &c., but no use.

May 1 *and* 2.—Took 120 m. of tinct. ferri perchlor., and on

May 3 *to* 6.—180 m. per day.

May 7.—300 m. per day.

May 30.—Acid and quassiæ.

June 5.—Well.

The good effect of iron was seen in passage after a few days of tubular sloughs, some of them 3 inches long; he was in the most dangerous state, but recovered well; ipecac. could not be borne.

Case 6.—Private Edward Baxter, age 27, service 8 years.

Symptoms.—Convalescent in hospital from malarial fever; on 7th May was attacked with most profuse passage of stools of thin, dark fluid; this lasted for several days, and he was reduced to a most deplorable state of emaciation and debility. He was treated with large doses of tinct. ferri perchlor., and recovered well, being discharged on June 12th.

Case 7.—Private William Wilks, age 32, service 8 years.

Symptoms.—Nearly as severe a case as the last; was treated in same way, and recovered well.

Case 8.—Boy, A. Troupe, age 17, service 3 years.

Symptoms.—The same passage of thin blood-stained non-feculent stools; treated with tinct. ferri perchlor., 200 to 300 m. per day. This boy has had very many relapses of fever since, but no more dysentery.

Case 9.—Boy, J. Cusack, age 17, service 2 years.

Symptoms.—Precisely same symptoms and treatment as last; and though he has had very many relapses of fever since, has had no other attack of dysentery.

Case 10.—Boy, William Campbell, age 17, service 2 years.

A most severe attack of same sort of dysentery, and same treatment; recovered very well.

Case 11.—Private Robert Grabby, age 28, service 8 years.

A most dangerous and severe attack, with same symptoms; but passed, after taking the iron, a large number of tubular sloughs; recovered well.

The above eleven cases were of the peculiar dysentery which attacked the regiment at Flat Island, characterised by passage of enormous quantities of thin blood-stained fluid.

The following cases were the fatal ones of ordinary dysentery which occurred during the fever time, viz.:—

Case 1 A.—Private Patrick M'Namara, seized with dysentery of ordinary type, and malarial fever; refused obstinately to take any medicine, and died on the night-stool.

Sectio cadaveris, 8 hours *post-mortem*.

All organs healthy, but

(1.) *Spleen* pulpy; about × 3.

(2.) *Large intestine* full of ulcers, with ragged edges and foul sloughs, and coats good deal thickened.

Case 2 A.—Private Thomas Jones, had had several attacks of dysentery from October 1866; had several mild attacks of ague, and got fearfully reduced at Flat Island; died 24th April, 1867; the symptoms being of the ordinary dysentery.

Sectio cadaveris, 6½ hours *post-mortem*.

Large intestine in universally sloughy and ulcerated state, but more especially at rectum, which was attached to anterior wall of abdomen, in middle line above the bladder; here was a small perforation partly filled up and protected by recent soft lymph, some of which lay amongst intestines in the neighbourhood. In some parts, especially of ascending colon, gut so thinned that outer coat formed a series of small protrusions or hernias, thoroughly thickened parts of coat.

Spleen, natural in size. All other organs healthy.

The last two cases, viz. 1 A and 2 A, were of the ordinary dysentery, both in symptoms and pathology, and require here no further remarks. The eleven previous cases give all the fatal cases, with a selection of eight recoveries out

of a larger number which occurred at Flat Island. Case 3 looks like a case of cholerine, *but his first stools* were the same dark colour as the rest of the cases.

Case 2 showed very little *post-mortem* lesion, but the stools were not at all, at any stage, rice-water like Case 1, which was a very marked case. Of the other cases, very many were as severe as the fatal ones. This form of dysentery looks very much like that called in books "scorbutic dysentery." The two stages of the lesion seems to be general prominence and distension of all the intestinal glands; and if carried further, instead of each forming an ulcer, a general death of the two internal intestinal coats ensue, and they are thrown off as sloughs. This was very marked in Case 1; and in several of the cases which recovered, large portions of the intestinal tracts were thrown off as sloughs, though in most the disease was arrested before this stage of sloughing came on. Some fifty cases in all of this form of dysentery occurred, but in a good many it was so soon arrested by the tinct. ferri perchlor. that they were not admitted into hospital. A large proportion occurred in men who were in hospital at the time. Two cases of dysentery were left behind, and died at Flat Island, but unfortunately no details of the *post-mortem* appearances reached us.

Causation of this Form of Dysentery.—At first blush that convenient scapegoat malaria might seem to have been the exciting agent of this dangerous and rapidly fatal form of dysentery; but this cannot be the case, for the following two reasons:—(1.) Of the three men who died of it, one never had fever at all, while *post-mortem* no enlarged spleen or other sign of fever was found; and the other two had not suffered remarkably from fever. (2.) While this form of dysentery was confined to Flat Island, where, as we have shown, malaria was not present, *at Port Louis, the centre of the malarious district, no such cases of dysentery occurred*; and indeed only three cases of dysentery in all occurred there from 1st April to 24th May, and those three at about the same time in the week ending May 24, and they were cases of the ordinary dysentery. At Cannoniers' Point, from the 16th February to the 31st May, only seven cases of dysentery occurred; and none of these presented any variation from the usual dysentery of Mauritius, and were far less in amount than at Flat Island: thus the amount of influence the malaria had in causing this variety of dysentery was no more than that of any other disease tending to bring down the health below par. To what, then, can we attribute this disease? We believe solely to the effects of exposure, in a hot sun, of men who were enfeebled by the effects of malaria, together with poor food, and especially the want of such bland food as milk, good vegetables, and bread; for in these Flat Island was wanting, while they were procurable both at Cannoniers' Point and Port Louis. This is borne out by the fact that in the character of the stools there was a close resemblance to the form of dysentery called *scorbutic*, which is owing to improper, or want of certain articles of diet—in our case this want not being carried to such an extent as to cause any general signs of scurvy. At the same time lime-juice had been issued to all as a precaution, but was found to add to the intestinal irritation, and was therefore discontinued. Again, in connection with the supposed intimate relation between malaria and dysentery, which has been assumed so often, we find that out of a regiment in which 671 men were, attacked by fever, 102, or 15·2 per cent., had dysentery during the fever epochr and that of these 16 had had one or more attacks of dysentery before the fevee broke out; and that there were 52 men who had had dysentery before the fever broke out, and some of them had been almost chronic cases, and these 52 men had no dysentery during the epidemic of fever. Again, dividing those who suffered from dysentery into four classes, as regards the severity of fever from which they suffered, we find—

1. 1 man who *died* of dysentery had had *no fever.*
2. 36 men had dysentery, who suffered only *slightly from fever.*
3. 52 „ „ „ *severely from fever.*
4. 13 „ „ „ *very severely from fever.*

Summing up all these points it would seem that, as regards the epidemic of malarial fever in Mauritius, certainly the malaria had no influence on the causation of dysentery more than any other weakening disease; and as far as we have been able to learn, dysentery has not been more frequent in Mauritiu

since the epidemic. Whether this holds good elsewhere we forbear to say, but in Mauritius, it would seem certain that there is no such thing as malarious dysentery, and that the presence of dysentery in malarious countries is a mere coincidence, and not cause and effect. Further, we found that giving quinine in these cases was followed by no advantages, and indeed seeing that one of our first cases of this form of dysentery occurred in a man who had never had any fever, we were not much encouraged in the supposition that it was of malarious origin.

Treatment.—I have already incidentally noticed this. Ipecac. in large doses, usually so successful, was quite useless; calomel, in 10 gr. doses, served no better; sulphuric acid and opium were equally unavailing; quinine gave us no assistance, *but the tinct. ferri perchlor. in doses amounting from* 200 *to* 400 *ms. per day, succeeded most admirably;* we have seldom, except in the cases of quinæ in malarial fever, and ipecac. in ordinary dysentery, seen a drug which effected so much, and to such purpose, as this salt of iron did in these really terrible cases of dysentery, though of course further experience is required to make sure of its value elsewhere.

APPENDIX II.

Prevalence of "enteric" (typhoid) fever during the epidemic of malarial fever.

From July 13th, 1866, to March 31st, 1867, during which time the regiment was stationed in Port Louis, 10 cases of enteric fever occurred among the non-commissioned officers and men, of which four were fatal.

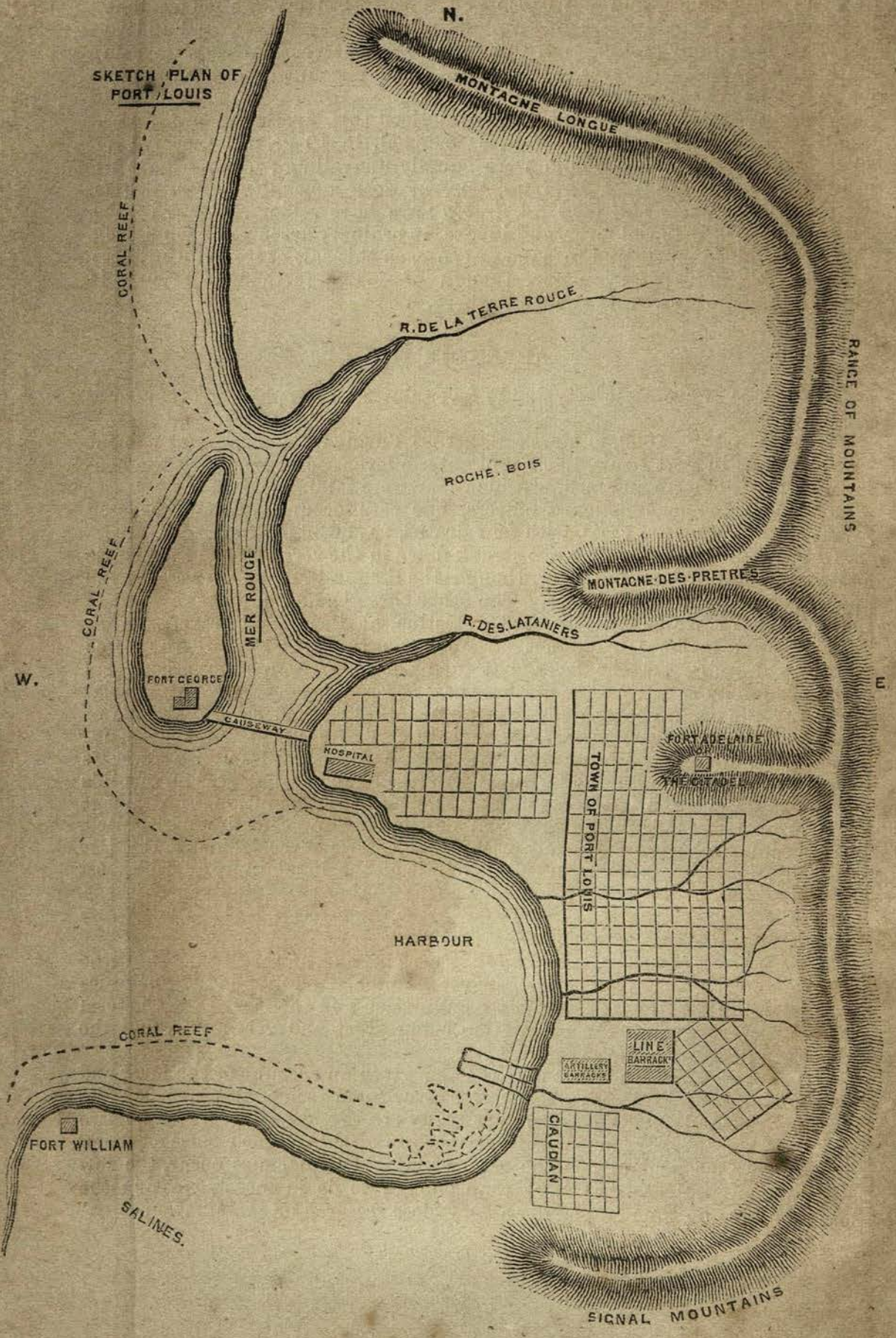
Amongst the commissioned officers, one case occurred, who recovered giving a total of eleven cases, with four deaths, *i.e.*, 36·36 per cent. were fatal.

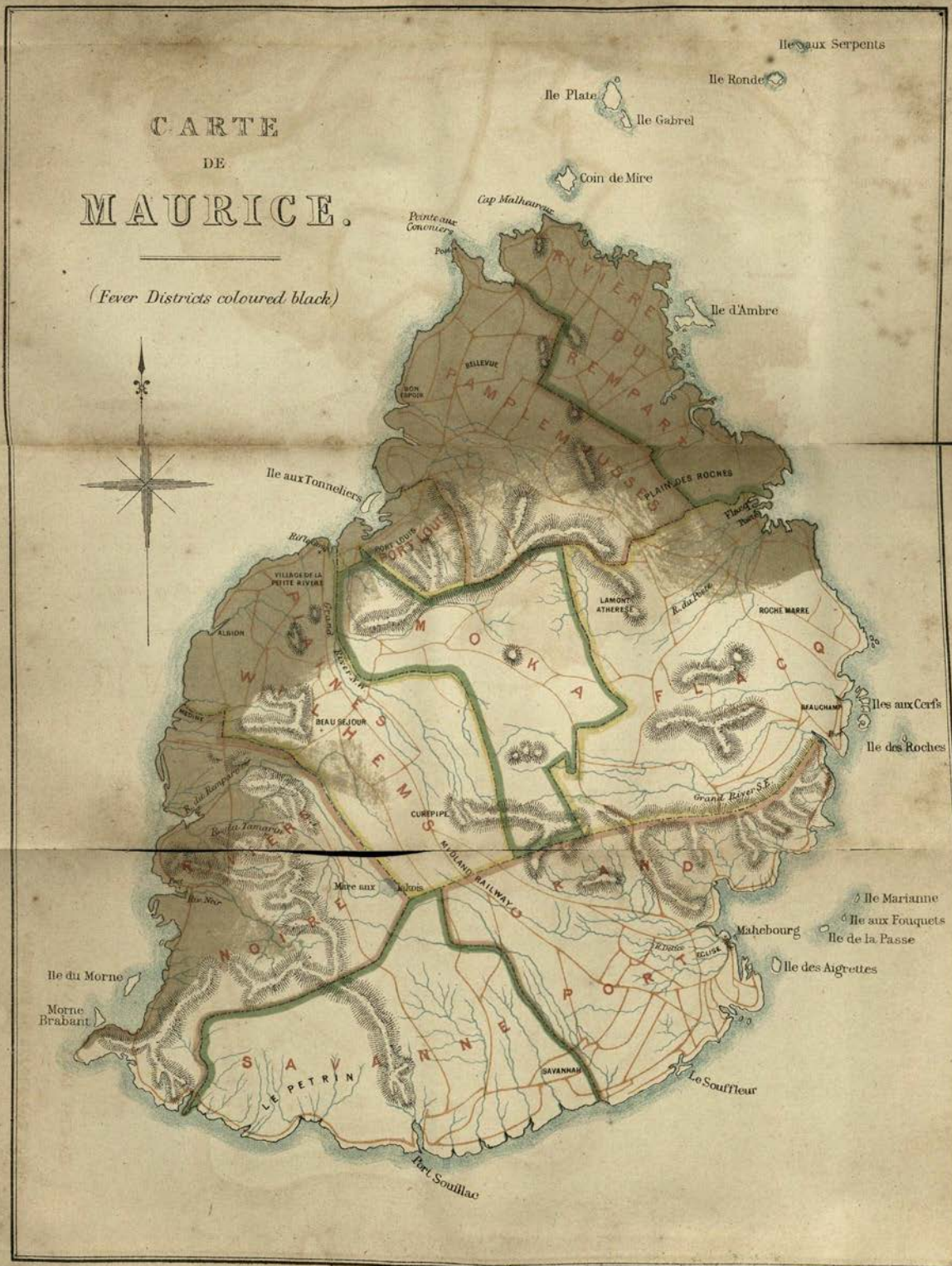
Of the fatal cases, the first was struck down in the very onset of the disease and died on the fifth or sixth day, though the diagnosis, and even *post-mortem* appearances were rather obscure. The other three had a most severe form of the disease, in which the diseased intestine, at ileo-coecal valve, was so prominent as to form a distinct large elastic tumour; one of the three convalesced well from the fever, but died shortly after from psoas abscess undetected during life. None of these cases were complicated with malarial fever, but the commissioned officer (a young Ensign) had several attacks of "malarial fever," the fever was in his case very severe, but fortunately not complicated by hæmorrhage, &c. A certain amount of enteric fever is generally found amongst the troops in Port Louis in the hot season, but this season there were a greater number. Seeing the condition of drainage matters in Port Louis, such might well be the case and though unrecognised, there were probably very many cases of "enteric fever" during the late epidemic, and the peculiar and dirty habits of the inhabitants afford a most excellent opportunity for the spread of this disease; but apparently it has, as a rule, been called by some other name, and has not been distinctly diagnosed.

The cases we have given were all, but perhaps one, undoubted cases of true "Enteric fever," as proved by the general symptoms and range of temperature and in cases of death by *post-mortem* examination; in the fatal cases the form was very severe, indeed the prostration being great and very early, and the extent of intestinal lesion very great.

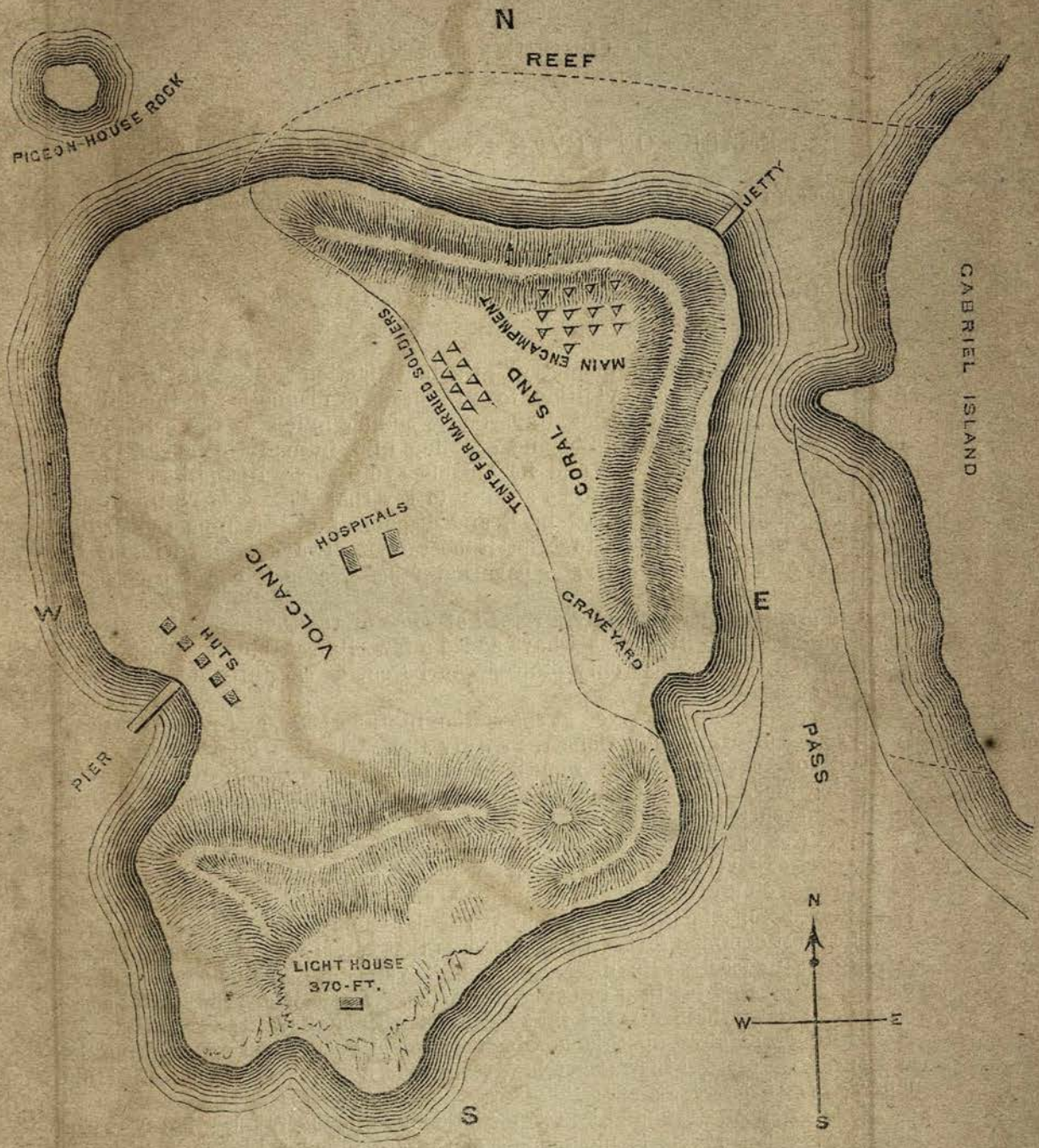
Conclusion.—We trust that we have now given an account of the fever and its accompanying diseases, sufficient to convey some decided impressions of its origin, cause, and fatality. There are many errors and imperfections, but we may plead the excessive amount of work thrown on us as some excuse for shortcomings, for, as generally is the case when these epidemics occur, the few medical men present have more than enough to do in merely treating the sick, and have no time for making a very close research or examination.

PLAN OF PORT LOUIS.




CARTE
DE
MAURICE.
(Fever Districts coloured black)
Ile aux Serpents
Ile Ronde
Ile Plate
Ile Gabrel
Coin de Mire
Cap Malheureux
Pointe aux Cononiers
Ile d'Ambre
RIVIÈRE DU REMPART
PAMPLEMOUSSES
BELLEVUE
BON ESPOIR
PLAIN DES ROCHES
Ile aux Tonneliers
PORT LOUIS
VILLAGE DE LA PETITE RIVIÈRE
ALBION
Grand River N.W.
LAMONT ATHERESE
R. du Poste
ROCHE MARRE
MOKA
FLACQ
BEAUCHAMP
Iles aux Cerfs
Ile des Roches
WILHEMS
BEAU SEJOUR
MEDINE
R. du Rempart
R. du Tamarin
CUREPIPE
Grand River S.E.
MIDLAND RAILWAY
GRAND
RIVIÈRE
Mare aux Jakois
Ile Marianne
Ile aux Fouquets
Ile de la Passe
Mahebourg
R. Delice
ECLISE
Ile des Aigrettes
NOIRE
Ile du Morne
Morne Brabant
PORT
SAVANNE
LE PETRIN
SAVANNAH
Le Souffleur
Port Souillac

PLAN OF FLAT ISLAND.



APPENDIX No. XLVII.

REMARKS ON FEVER IN MALTA, WITH CASES;

WITH SPECIAL REFERENCE TO THE USE OF THE THERMOMETER IN DIAGNOSIS AND PROGNOSIS.

By Assistant-Surgeon J. P. H. Boileau, M.B., 29th Regiment.

The application of thermometry to the investigation of disease is now recognised as a very valuable addition to our means of diagnosis; to the military practitioner it is of especial importance, adding much to the certainty of prognosis as well as of diagnosis, and enabling him, in many instances, to foretell the approach of evident and formidable symptoms. In masked forms of febrile disease he may thus too be enabled to say that disease is really present with a certainty hitherto unattained, and dispose of his morning sick with a justice to them and credit to himself he cannot always secure without the assistance of the thermometer. I have never had reason to regret trusting to its indications.

The present paper is mainly a record of some of the thermometric observations which I made in Malta. I have added a few clinical remarks; but I may say that the contribution only professes to be one of carefully observed facts, faithfully set down.

The 29th Regiment arrived at the station in June 1865, and remained there two years, embarking for Canada in July 1867. It was quartered at Fort Ricasoli for the first twenty months, and in Lower Fort St. Elmo for the remaining four. It was during the latter period that the cases which I have tabulated occurred.

I had the opportunity of observing in Malta more than four hundred and fifty cases of fever, and the remarks which I shall make are the result of observations on all these fevers. The facts are impressed by general observation, though capable of proof only by particular examples.

The most common fever at the station is that called "Maltese." The propriety of thus locating the disease is, I admit, very questionable; but I believe we are at present justified in using the name. Those who study fever elsewhere can state whether or not they have met with similar cases.

Nothing will clear up this nosological difficulty so quickly or so certainly as accurately-recorded thermometric observations, and that is the object of this paper.

Maltese Fever.—If I might presume to define this fever, I would say it is a sudden accession of febrile phenomena of the continued type, gradually disappearing in about seven days by lysis, unaccompanied by any eruption, and characterised by debility, anorexia, thirst, white tongue, quick pulse, and frontal headache.

Ordinary Symptoms.—The patient is seldom more than twenty-four hours ill when he reports himself sick. "The day before yesterday" he was perfectly well. Many patients were in their usual health "yesterday morning." He is now weak and languid, suffers from vertigo, often staggers like a drunken man, complains of frontal headache, loathing of food, has a bad taste in his mouth, is thirsty, inclined to vomit; probably has done so. One says he has vomited a pint of blood, more probably a pint of Sicilian wine; another, and these are many, a quantity of yellow or green matter. Very commonly he suffers from general pains, more frequently of the legs and lumbar region only. His eyes are suffused, and the face is flushed; he shivers. One man has been

very freely purged; another has been constipated for several days; a third does not suffer from any such irregularity. The tongue presents every shade of white, from the semitransparent glassy film to the coating resembling thick white paint. This latter is, however, more characteristic of the third, fourth, or fifth days of the disease. The pulse is increased in rapidity, but in various degrees, from 100 to 148; it has no other characteristic; may be large or small, soft or hard, compressible or the reverse. The respirations are slightly accelerated. The temperature is about 101·5°, perhaps 103°. There is very little, if any, deviation from the normal respiratory sounds, although pulmonary distress is common. The pharynx is often redder than natural, and sometimes there is tonsillitis.

On the third day of the fever there is very often an aggravation of all the symptoms above described, and very frequently on this evening the highest temperature occurs: it averages 102 6°.

On the fourth day there is generally a decided amendment, and during the following days the improvement continues.

The average duration of the fever is seven days; the average number of days in hospital about eight.

The large majority of patients make good and rapid recoveries.

Exceptional Cases.—The fever may last ten or eleven days, but this does not affect convalescence.

The frontal headache may be almost insupportable. A patient, with the expression of great suffering, will sometimes say, "It is *all* in the head,"—a symptom which local depletion seldom fails to relieve. Delirium is *very* rare.

The vomiting may persist for three or four days, the patient rejecting all ingesta, and bringing up a quantity of greenish watery fluid.

Jaundice occurs occasionally. I very seldom saw it amongst the patients from Ricasoli, but very frequently amongst those from St. Elmo. It commences about the fifth day of the fever, by a slight icteric tinge which rapidly deepens as the conjunctivæ become yellow, and the urine darkens. It is most intense about the fourth day after its first appearance. It prolongs convalescence, but otherwise is of no importance in a healthy subject. It does not prolong the fever.

The muscular pains in the calves of the legs are occasionally very severe. I have seen patients who made scarcely any other complaint.

Insomnia is sometimes very troublesome. Nervous apprehension is uncommon, yet in one patient it was most painful to witness; and to a casual observer he appeared dangerously ill, which he was not.

Epistaxis is not at all uncommon, and is occasionally very severe. Once I saw it alarming. It appears to be conservative, and rather to be encouraged than otherwise. Patients are always better after it.

The thoracic viscera are seldom affected beyond a slight pulmonary distress and precordial anxiety, which is common. Bronchitis does occur, but inflammation of any kind is rare.

Suppression of urine, to a greater or less extent, occurs sometimes. It is a very bad sign in an old soldier, but the young man recovers.

Diarrhœa in a few cases is severe, but generally is of little consequence.

In one case nocturnal diaphoresis of the most profuse character occurred.

The Range of Temperature.—The accompanying graphic representations are specimens of the range of temperature in cases of Maltese fever. There are not any two exactly similar, but they possess characteristics which distinguish them from any delineations of human temperature that I have hitherto seen. They differ from the typical diagrams of the continued, intermittent, remittent, and ephemeral fevers, and from the exanthemata in their average duration, range, and gradual tendency to decline.

Table B exhibits the highest temperatures I have observed on the several mornings and evenings of the fever, and this illustrates the severest case that is likely to be met with. It is the result of more than nine hundred observations recorded, and of numerous others unrecorded.

The lower black line shows the mean evening temperature of all the cases tabulated for this paper. It cannot deviate far from what we might define as a typical case.

The temperature of the patient on admission is generally about 101·5°, but

it may be 103°. I have frequently observed higher temperatures than this in patients on admission. In pneumonia, for example, or erysipelas, acute tonsillitis, extensive submammary abscess, &c.; but in no case of Maltese fever have I ever seen it higher than 103° on admission. An emetic almost invariably raises the temperature about 1°. Does this shorten the fever, as a poultice shortens the course of a boil by anticipating the natural process? Rarely is the temperature of the body lower after an emetic than before it.

On the evening of the day of admission the temperature will be generally over 102°. I have seen it as high as 105·4°, and frequently over 104°. In such cases the fever generally lasts seven or eight days.

On the day after admission, or the third day of the fever, the morning temperature falls about 1° below the previous morning, being generally below 101°. If it is higher, the fever will probably be longer than usual. The evening temperature is also generally lower than on the previous evening—under 102°. I have seen it 104·8°, without any bad symptom. At the same time this temperature was 0·6° below the previous evening.

It is on the second or third evening of the fever that the highest temperature is generally reached, and it will seldom be under 103°. This acme of the febrile state may be delayed, however, until the fourth or fifth evening; and in one case the highest reading was not taken until the sixth of a nine-day fever, and this was subsequent to the pulse falling to 88, the tongue cleaning perfectly, and the patient expressing himself free from headache and rapidly recovering. In another case the highest temperature (102·4°) was not reached until the fifth evening of another nine-day fever. The observation was taken two hours previous to a very alarming attack of epistaxis; the following morning the temperature had reached the normal standard, but for three subsequent evenings it was above 100·5°.

On the fourth and following days the temperature gradually declines, each morning and evening being respectively lower than the previous. This is the rule. On the seventh or eighth day the normal stability becomes established. A few cases exceed this duration. I have on two occasions observed a temperature of 100° on the ninth evening, and in one case 100·2° on the evening of the tenth day.

It will be seen by examining the tabular statement that, in estimating the duration, I have assigned 99° as the maximum limit consistent with the permanent absence of fever. This result I have arrived at after several thousands of observations on the temperature of sick and healthy men.

The defervescence of this fever cannot be considered completed until the temperature has been recorded at least one morning and one evening under 99°, *the thermometer being kept in the axilla for five minutes.*

The etiology and pathology of this fever are not by any means satisfactorily demonstrated. Meteorological conditions, defective hygienic arrangements, and constitutional predisposition from pre-existing organic disease, or other morbid peculiarity are causes assigned, and the brain and the liver divide the credit of receiving the unwelcome guest.

I believe the most powerful predisposing causes are intemperance and indolence, which disturb the balance of function between the lungs and the liver. Young men of the most robust health, free from the suspicion of organic lesion, are as subject to it, if not more so, as the old soldier whose medical history sheet might be filled with intestinal or malarial diseases.

The symptoms indicate a very early disturbance of the chylopoietic viscera; gastric irritability, bilious vomiting, anorexia, and loaded tongue are often the first symptoms of disease, and I have seen cases in which they preceded the signs of disordered nervous function, such as rigors, pains, insomnia, &c. Jaundice is often observed, and the bilious vomiting is very common; the hepatic function is most assuredly deranged. I have never, however, detected any enlargement of the organ, nor of the spleen either, although by palpation and percussion, I sought over and over again for such conditions: it was very rarely indeed that hypochondriac tenderness was complained of. *I have no doubt that defective hygienic arrangements are the most powerful efficient causes.*
that defective hygienic arrangements are the most powerful efficient causes.

During the months of March, April, May, and June, 1866, the regiment occupied Fort Ricasoli, a place certainly defective in a sanitary point of view,

but infinitely superior to Lower Fort St. Elmo, which is nothing but a receptacle for the miasma generated by the crowded populace of Valetta; a well of disease, whose sides were peopled by our soldiers. The regiment sent 36 cases of fever to hospital from Ricasoli during those months; during the corresponding months of 1867 it sent 77 from Lower Fort St. Elmo. Everyone who has been any time in Malta knows that this fort is a fever haunt, that it is not fit for human habitation, and all diseases of an admitted zymotic origin coming from it are without hesitation attributed to the sanitary defects there existing. Now "Maltese fever" is very generally supposed to be due to the sun's heat. I think, however, it will be found to have some special cause, of which the genus is what we call zymosis. Predisposing causes there are no doubt, and exciting causes too, but I believe the efficient cause is due to defective sanitary arrangements.

The main sewers of Valetta discharge themselves close under the town end of this fort, St. Elmo. And I may mention that of the cases which are the subject of this paper, the six companies which occupied rooms farthest from this source of evil, and the badly constructed urinals and latrines, sent less fever to hospital than the four companies which occupied the rooms at the town end in their vicinity. At this end of the barracks the stench, which was always bad, was sometimes perfectly intolerable.

Very few women or children were attacked at this time, only three non-commissioned officers, and not one commissioned officer. 26 soldiers, with their families, occupying the elevated Crown and Horn works at Floriana, escaped. There was not one single case amongst them during the period referred to, yet these people had daily to walk a distance of over a mile, under the burning sun, to their various duties, or for the purpose of buying their provisions, carrying washing, &c.

The subject of this paper is "Maltese Fever."

Two fatal cases occurred, one from pericarditis, the other from advanced organic disease of both kidneys. The former had certainly no physical sign of the fatal affection until the ninth day of the fever. The persistent quickness of the respirations, and the rapidity of the pulse when his temperature was falling (*see* diagram 14), showed that we had more to deal with than "Maltese fever;" but what that was we did not know until the ninth day, *although the heart had been frequently examined.* He certainly had dysphagia, for which inspection could not account, nor exclusive diagnosis assign a cause, and still it was very significant, for Dr. Stokes has pointed out the frequency with which pericarditis is preceded by this symptom.

With regard to the second fatal case, it appeared wonderful that the man could have lived to 40 years of age with such important organs in such a condition. Both kidneys were far advanced in fatty degeneration, the proper structure of these organs being almost entirely replaced by that substance; scarcely a uriniferous tubule could be seen. He became jaundiced on the third day after admission, was convulsed on that evening, and died comatose next day (diagram 36).

And thus it is that "Maltese fever" may kill not *per se*, but by lighting up a disposition to visceral lesion, or by requiring more resistance from a system already nigh overcome by organic disease than it is capable of giving. In such cases this mild fever is just sufficient to outweigh the balance of life.

The treatment requires but a few words; it is very simple—confinement to bed, low diet, without extras, and saline drinks, after the action of an emetic, is all that is required. The emetic almost invariably used was ipecacuhanæ gr. xv, tartar emetic gr. i. The saline drink, which the patients used *ad libitum*, was made by adding to a pint of water half an ounce of bitartrate of potash, the juice of a few lemons, and a little sugar.

Special indications sometimes occurred, and thus linseed meal poultices were used to relieve pulmonary distress, a dozen leeches to the temples to allay the frontal headache; compound powder of jalap, combined with calomel, to relieve obstinate constipation; liquor opii sedatives or wine to procure sleep; diuretics, &c.

Quinine was occasionally given during convalescence. I believe, however, that this medicine might be banished from Malta without much loss to the station.

The idea of treating any case of fever which came under our observation in Malta by general depletion would be most absurd. A very different opinion was held by physicians in the commencement of this century.

Mediterranean Gastric Remittent Fever.—I do not think we are yet in a position to say that this fever is peculiar to the Mediterranean, or that it is only an anomalous form of a fever already described. I am doubtful also as to the propriety of calling it remittent. One name seems to me more universally applicable than any other, on account of its protracted character, the *long fever*; but as it has been already named, I shall, for the present, adopt the designation of "Mediterranean gastric remittent."

There is only one way of describing it to those who have not seen it. Unfortunately my notes of all the cases which have passed under my observation are not sufficient for a systematic description, but I am able to detail four or five cases pretty fully, and these I shall now give:—

Case 1.—Ensign ——, aged 20 years (January 9, 1867), has been for the last fortnight the subject of general "malaise," languor, lassitude, increasing debility, disturbed sleep, anorexia, and thirst. Hoping the indisposition was temporary, he did not seek medical advice until his failing strength obliged him to absent himself from duty. The tongue is now loaded with white fur. His temperature 103·2°, and pulse lying 96. There is evidence of bronchial irritation in the short dry cough, but no auscultatory signs.

Evening temperature 103·8, and pulse 96.

After a careful inquiry into the nature and duration of the prodromata, I set this day down as the 15th of his fever.

During the next seven days, his temperature varied from 99·6° to 103·6°, pulse averaged 80, and respirations 24. The cough continued troublesome without any stethoscopic signs of disease beyond a slight harshness of the respiratory murmur, the tongue very white in the centre, clean and reddened at the edges and tip, quite moist, and of full size. He suffered occasionally from diarrhœa, the stools being feculent, liquid, and copious. He complained of weariness and "aching," but not of headache, slept moderately well, sometimes very well. The skin was always moist, occasionally perspiring; sorethroat annoyed him for a few days, and the fauces and pharynx were very red. He also complained of inability to lie on either side, in consequence of pains in the other (hypochondrium) if he did so. Thus he passed the first three weeks of his illness.

From the 22nd to the 27th day of the fever he appeared to be progressing most favourably, in fact, convalescing. The temperature steadily declined; it varied from 98° to 102·4°. It must be noted, however, *that his evening temperature did not fall below* 101·2°, and he had been under observation 11 days. His pulse during this period averaged 83, and respirations 23. He made no complaint. The daily record of the Case-book was: "Tongue clean, slept well, no complaint, no medicine."

On the 26th morning of the fever, temperature was 98°. Pulse 76, respirations 24, and a very natural prognosis was speedy recovery; not so, however. This was on the 20th of January, and on the 25th February, when he was still invalided, he was still in fever.

On the 27th day of his illness his morning temperature suddenly rose to 104°, it having steadily declined to 98° up to the previous morning. The subjective phenomena were not at all alarming; he had no pain or uneasiness whatever. At 11 A.M. he vomited his breakfast. At noon his temperature was 103·5°, and pulse 100, respirations 24; at two P.M. temperature 103·4°, pulse 100, complaining of thirst; at six P.M. temperature 102·8° (this was 1·6° higher than the previous evening), pulse 96, respirations 26, tongue quite clean, skin moist. That night he slept very well, and in the morning his temperature had fallen to 100·6°, with a good pulse of 92, and respirations 20; and as he made no complaint whatever, we hoped that the heat shown by the thermometer was but a temporary accession of fever, but in the evening it marked 103·6°, and the pulse was quicker than ever, 104.

During the next four days (29th to 32nd of illness) he was purged a little, and the skin perspired freely; cough much less troublesome, temperature varied from 100·8° to 103°, pulse averaged 93. He complained of nothing but debility; he was able to read and talk, and sit up in bed to take his nourish-

ment, and to a casual observer appeared very much better than he really was.

On the 33rd day he was moved out, bed and all, into the open air, as the weather was very fine, clear, still, and warm. In the evening he had an accession of fever 103°, with a pulse of 100. On the following day (34th) there was a very marked improvement, temperature having fallen in the night from 103° to 98°, and in the evening did not rise higher than 100°, but his pulse was 100. Still we hoped once again that convalescence was at hand, for he slept remarkably well without medicine, and his tongue was perfectly clean, moist, and normal in size and shape; but we were disappointed.

About this time his skin, which had always been moist and frequently perspiring, became most extraordinarily active in its function. The diaphoresis which subsequently became the prominent symptom was something dreadful. I had never seen such in any disease before; night-gowns, pillow-cases, pillows, sheets, blankets, and bed would be saturated in a couple of hours.

Many days and nights his clothes and bedding were changed three and four times, and his skin dried with warm towels after sponging with tepid water.

From the 35th to the 43rd day of the fever the evening temperature continued high, ranging from 100·5° to 103°; still he made scarcely any complaint, reading and conversing as he had always done. The cough was rather troublesome, and occasionally excited vomiting. A few sonorous rales were heard in the lungs. He generally slept remarkably well, but invariably awoke in a profuse perspiration.

On the 44th day his morning temperature was 99·6°, pulse 76, respirations 24, and the evening 99·4; but with characteristic irregularity, next evening it was 101·4°. About this time the cough was very troublesome, occurring in violent paroxysms, yet there was scarcely any stethoscopic sign of disease. He was deaf for two days—at least, one had to speak quite loud to him.

He was allowed out of bed on the 46th day, and then one appreciated the great emaciation he had undergone. Yet he was able to support himself much better than could have been expected.

On the 13th February I find the following note in my case-book:—"He has now been on the sick-list 34 days, and this is the 50th day of his illness. He is progressing very favourably, and gaining strength, but he is still the subject of very severe night sweats. The cough and all pulmonary irritation have quite disappeared. He complains, however, of a pain in the left side, which prevents him from lying on the right. I cannot discover any condition of the lungs, heart, spleen, or liver to account for this, either by percussion, auscultation, or general symptoms. Temperature is quite normal this morning."

He was invalided home on the 25th of February, and was very soon benefited by the change, but for nearly two months was the subject of occasional general pains and night sweats.

In October he rejoined his regiment in Canada, looking and feeling as well and as strong as ever he did.

The treatment in this case consisted in keeping the patient in bed,—a merit of necessity. His diet consisted nearly exclusively of milk, but one or two pints of beef tea were allowed in the day if he preferred it. After the first week he had five ounces of port wine daily. Two or three times during the first week of observation ten grains of Dover's powder were administered at bed time, and subsequently the same was given occasionally.

Many days of his illness he had no medicine whatever. On the 27th January, or 33rd of the fever, he commenced quinine, and took from four to six grains daily with diluted sulphuric acid.

On the 1st February, or 38th day, he had 50 grains bromide of potassium in ten grain doses, as the cough was very troublesome, and excited vomiting; it did very little good. Next day he had infusion of senega and tinct. opii camphorata, and on the following day the medicine was continued with benefit.

On the 19th January, or 25th day, and on the following, he appeared to be so much better that he was allowed roast chicken, and his friends sent him some jelly, which I allowed him to take. Next day he relapsed.

Case 2.—Ensign ———, aged 19 years (January 10th, 1867), has been for the last five days complaining of languor and weariness, with a constant sensation of cold down his back, severe frontal headache, pains and stiffness of the

limbs, great thirst; temperature 101·6°, pulse 90, full and bounding, skin perspiring most profusely, tongue quite clean. Evening temperature 103°, pulse 88, and respirations 24; skin still perspiring profusely, frontal headache worse. Such was his state on the fifth day of his fever, the first of observation.

On the sixth day temperature 102·5°, pulse 92, respirations 22, purged excessively during the night, tongue yellowish furred; has no cough, but feels a troublesome tickling in the throat; urine very scanty; has had slight epistaxis. Evening temperature 101·6°, pulse 100, respirations 28. Bed and bed-clothes saturated through by the excretion from the skin.

Seventh day, temperature 101·2°, pulse 104, full, respirations 28, tongue thickly coated with white fur, urine very scanty, no purging, but diaphoresis excessive. Evening temperature 104, pulse 120, respirations 28. Bowels moved twice during the day, suffers intense diaphoresis. At midnight his temperature was 102·2°, pulse 96.

Eighth day. Several thinly scatterred rose spots on the trunk, fading on pressure, and well defined; temperature 101·2°, pulse 96, respirations 24, tongue very white. Evening, temperature 104°, pulse 100, respirations 24, bowels freely moved. He now got into a most nervous and apprehensive state, which continued throughout his illness. Up to this time the only medicine given was the imperial drink of the bitartrate of potash. This evening he had ten grains of Dover's powder, and slept moderately well.

January 14th to 19th. From the ninth to the 14th day of his fever he progressed most favourably; temperature declined steadily every day from 104·2° to 98° by evening observations, and from 102·5° to 96·8° in the morning. On the 14th day his morning temperature was 98°, and evening 99°; morning pulse 76, evening 80, respirations 16 and 18. The thick white fur was cleaning rapidly from the tongue, but it was there still in patches. The intense frontal headache had entirely disappeared, and the excretion of the kidneys had nearly reached the normal quantity; the skin continued to perspire; purging and epistaxis occasionally occurred. The only medicine he had had for six days was one ten grain dose of pulv. ipecacuanhæ co. He appeared and felt so well that he was allowed the wing of a roast chicken, and a little calf's-foot jelly, in addition to his milk and beef tea. On the following day he was rather worse. Evening temperature 102°.

Sixteenth day. Temperature 99°, at 2·30, 101·6°; and at 6 P.M. 103·5°, with a pulse of 110, and respirations 25.

January 22nd to 29th. From the 17th to the 24th day of the fever he remained in much the same state. Morning temperature averaged 101°, and evening 103·5°, average pulse 100. Skin was burning to the touch, yet very seldom dry, tongue loaded with white fur, rest disturbed by dreams, and he wandered occasionally at night. He had some slight sore throat, and a slight cough. He was in a state of pyrexia, yet he made scarcely any special complaint. He read his book and conversed freely with any one of his brother officers that went to see him. He was, however, in a most nervous and apprehensive state. I never saw a patient who so exclusively directed his attention to his own condition. He was literally afraid to turn in bed or move his limbs without permission.

January 30th to February 8. From the 25th to the 34th day he seemed to improve, he slept better, and complained only of diarrhœa, which occasionally troubled him, but not to any extent. The fever still continued. During this period of nine days his morning temperature averaged 100·2°, and evening 101·7°, pulse ranging from 90 to 100.

He never had what are called "low" symptoms; although nervous and apprehensive, he was always vigorous, and although he lost flesh very considerably, he was always well able to move about in bed, and at no time was he unable to walk or stand for a short time.

On the 13th February, the 39th of observation, I find the following note in my case-book:—Has been out of bed for five days, temperature has returned to the normal; he takes five grains of quinine daily, and there is little restriction as to diet." He was discharged from the sick list on the 14th February, and shortly afterwards proceeded to the south of France. He was apparently very much benefited by the change, but subsequently suffered from pneumonia and rheumatism. He recovered completely in two months.

The treatment of this case consisted in confinement to bed, the diet was chiefly milk, about two pints daily, with beef tea occasionally; no wine. He took the imperial drink *ad libitum*; ten grains of pulv. ipecacuanhæ co. were occasionally administered, and a few 20 grain doses of bromide of potassium were also given, and five grain doses of quinine towards the close of the fever.

Case 3.—Ensign ——, aged . This patient came under observation on the 3rd of April, 1867, about the seventeenth day of his fever.

In all probability he contracted the disease in Rome. From that city he went to Palermo, and was there several days, unable to proceed on his journey, confined to his room, and under medical treatment.

When I saw him, a few hours after his arrival in Malta, he was in a condition of great prostration, so much so that I ordered him half a bottle of port wine immediately. His temperature was 105·5°; pulse 108, very small and weak; tongue thickly covered with yellow fur, and very tremulous; his lips quivering. He was at once sent to bed, and ordered a few pints of milk daily. Wine also allowed. Next day, temperature 102·6°; pulse 104, stronger; tongue white and moist; complains of thirst; has a little headache; feels nausea. Evening, temperature 104·2°, pulse 108, suffers from pains in the limbs. On the following morning, pulse 104, and temperature 104°; suffering from constant nausea. In the evening, pulse 108, and temperature 104·2°.

April 6 to 12.—From the 20th to the 26th day of his illness the prominent symptoms were profuse diaphoresis, necessitating the constant changing of his clothes, anorexia, and restless nights with slight delirium. The tongue gradually cleaned, and the temperature declined to 99°, which was noted on the 8th and 9th mornings of observation, the 24th and 25th of the fever, and his evening temperature fell to 100·2°; pulse varied from 92 to 108.

When I visited on the morning of the 27th day, to my astonishment I found him up and dressed. So well did he feel that he would not stay in bed, and certainly he was very much improved in appearance, and in capital spirits—so much improved that I consented to his remaining out of bed for some time.

For ten days he continued to improve in health and strength and appearance, and he took his mutton chop and chicken daily, with his beer. I never thought of taking his temperature; completely deceived for 10 days.

On the 37th day he was unable to leave his bed, in consequence of pains in his limbs; and for 16 days he remained there. During this period he complained particularly of pains in the elbows and knees; the skin was always moist, and sometimes the perspiration was most excessive.

On the 44th day I find the following note:—"Appears much better; great improvement in the pains of the joints; appetite good; bowels regular; tongue clean and moist; everything favourable but the temperature—it is 103·1°." In the evening he was perspiring freely.

45th day. He is not so well; feels sick and weak; vomited two glasses of port wine, and has some diarrhœa; complains of a bad taste in his mouth; complexion sallow; cheeks flushed; still his spirits are excellent; he is lively and laughs. Evening temperature 103°. On the following day all the pains had disappeared; tongue quite clean and normal; able to walk about; temperature 102·2°; pulse 100.

For a few days he suffered from diarrhœa, anorexia, and dyspepsia. On the 51st day I find—"Diarrhœa continues; appetite is bad; he is wasting very much, and is extremely sallow in appearance; altogether he is getting worse, not better."

A Medical Board assembled, and recommended that he should be immediately sent home, which he was by the next mail-boat. He was able to walk up the companion ladder, and looked better when he started than he had done for many days.

On arrival at Southampton he was very ill, and was obliged to remain there forsome time under medical treatment. I believe he was considered to be dangerously ill, but in a few months recovered.

The treatment was the following:—On the 1st and 2nd days of observation he had not any medicine. He told me that whilst at Palermo he had taken large quantities of medicine, and was not allowed stimulants. From the 3rd to the 7th day inclusive, he had either liq. opii sedativa, grs. xxx, or tinct. hyoscyamus, dr. i, each night at bedtime. On the 8th day of observation (24th of

the fever) he commenced quinine, 6 grains daily; and it was continued until the 37th day of his illness. No other medicine given. Subsequently, fomentations of tincture of opium and carbonate of soda in hot water were applied to the affected joints. A mild purgative was also found necessary; and a few days before leaving, small doses of catechu and morphia were administered.

The diet consisted at first of liquid food—milk, beef tea, wine, &c. During the 10 days he appeared so well he was allowed mutton chop and chicken; but after this time the milk diet was resumed, and he did not tolerate solid food afterwards.

For the first 10 days he was confined to bed, and subsequently he was obliged to stay there again, in consequence of the arthritic pains.

On the 39th day of the fever he was carried from his quarters in Upper Fort St. Elmo to a better room in the General Hospital, and there he remained until he left the island, occasionally sitting out in the open air in the afternoon.

On the 53rd day of his fever he was put on board a Peninsular and Oriental steamer, and given in charge of the Surgeon. Probably the change of air saved his life.

Case 4.—Private H— H—, aged 21 years. Admitted into hospital on the 4th of May, 1867, and stated that he felt ill since yesterday only. He suffers from considerable debility, can scarcely stand, muscular tremors, vertigo, frontal headache, constipation, rigors, a bitter taste in his mouth, thirst, nausea; the tongue is quite clean; eyes a little suffused. Pulse 120 standing, and temperature 102°. Ordered an emetic, after the action of which his temperature did not rise, which is unusual. In a few hours he vomited a quantity of green matter. At 5 P.M. pulse 98, and temperature 101·2°. Next day his temperature was 102·2°; pulse 98 lying; tongue white, and he complained of pains in the head and back, and of severe vertigo; skin perspiring very freely; bowels regular. Evening temperature 104·6°; pulse 98; tongue very white.

From the 3rd to the 14th day of fever he improved, making scarcely any complaint. For six days his morning temperature was normal, varying from 98° to 98·6°.; but, *important fact for diagnosis*, the evening temperature ranged from 99·4° to 104°; and this fact alone constituted the only evidence of disease.

On the 15th day he wanted to leave hospital: his temperature was 98·2°; tongue perfectly clean, but his pulse was 120, and previous evening temperature 102°.* He was not allowed to; and fortunately, for in the evening his temperature was 104°.

On the 19th and 20th days he was very ill, his morning and evening temperature being respectively 102·2°, 105·6°, and 103·8°, 104·6°. The pulse showed great debility—104 lying, 120 sitting, and 132 standing; respirations over 30; skin sweating profusely, and he complained much of pains in the legs and back. No physical sign of pulmonary disease.

On the 24th day I find the following remarks:—"Pulse 96; temperature 103°; tongue perfectly clean; he is purged, and passes green stools involuntarily; expression is abstracted, like a person in 'coma vigil'; pupils normal; no spots whatever on the body. Evening temperature 102·4°."

On the 26th day I remark:—"The sum of this patient's ailments might be expressed by the words, 'feverish prostration'; for besides the temperature there is no positive sign of disease about him, excepting the debility. Evening temperature 103°.

On the 27th day he was sweating most profusely—the reaction of the excretion acid; and this continued for many days. The urine was very high-coloured, and he complained much of thirst. Pulse about this time varied from 72 to 96.

He was improving up to the 35th day of his illness: thus on the 33rd, morning temperature 98·8°, and in the evening 99·8°. Pulse for some days varying from 72 to 100; tongue perfectly clean, perspiration diminishing, and he was not making any complaint.

On the 35th day he was sent about seven miles distance to the Sanitarium

* The diagram of this case shows a temperature of 99·4° not 102°. I cannot now tell which is right; but I remember well that my chief reason for keeping the man in hospital was the persisting high evening temperature. *I would not allow a man out of hospital whose evening temperature was not under* 99·4°.

at Citta Vecchia, 600 feet above sea-level, and there he remained three weeks, during which time he felt himself getting stronger. I find the following remarks in the Case-book on the 26th June :—"Re-admitted, having returned to the Regimental Hospital previous to embarkation for Canada. This is the 55th day of his fever; temperature 100·2°; he is still in a very weak state, subject to debilitating perspirations; he makes no other complaint; has not any local pain or uneasiness."

On the 60th day he embarked on board Her Majesty's ship "Tamar," and he was in a state of great prostration, still suffering from profuse diaphoresis; pulse over 100, small and weak; temperature not under 100° yet.

On the 75th day, 15 days after embarkation, I find :—"He is improving; complains of a lumbar pain, relieved by the erect posture; still sweats, but not so profusely; temperature, for eight days, has varied from 98·2° to 99° in the morning, and from 100·4° to 102° in the evening; pulse under 90. No medicine since he came on board."

83rd day. Daily improving in health, strength, and appearance; morning temperature continues normal, and has been so for 19 days. Evening temperature continues above 100°; pulse for many days steady at 84.

On the 86th day he disembarked at Montreal, and was admitted into the Consolidated Hospital in Craig Street.

92nd day. Evening temperature averages 100·4°. He feels that he is getting better and stronger; is out of bed every day, walking about; appetite is good. Makes no complaint, beyond a very natural weariness at being ill so long.

August 8. On the 97th day, the weather being very beautiful, he was removed—on a stretcher, as he could not walk half a mile—to a marquee tent in the camp of the 29th Regiment at Logan's Farm. He improved there, and daily expressed himself getting better, still the diaphoresis and evening fever continued.

The following extract is from the Case-book :—

August 28th, 117th day of fever. "He has now been 20 days in the Hospital Marquee, and is scarcely, if at all, better than when he left Craig Street. He is up and walking about certainly, and makes no complaint, but he is very weak, especially after exertion, and his limbs are stiff. During the last two days the diaphoresis has returned as bad as ever, coming on about evening, and lasting the night. The day before yesterday he had severe rigors in the day-time; appetite is good; his temperature for a few days was normal, morning and evening, and he appeared to be improving; but he relapsed again, as will be seen by inspecting the diagram, as on the 109th day his temperature went suddenly, and without evident cause, up to 103°. Subsequently his temperature was taken four times daily, viz., at 8 A.M., noon, 4 and 8 P.M. for one month, with the result that 8 A.M. it averaged 98·6°; at noon, 100·3°; at 4 P.M., 100·8°; and at 8 P.M., 101·1°. He came to Hamilton on the 12th September, and it was not until the 11th October that his temperature was sufficiently low, and his health sufficiently improved to permit his return to duty.

During the last two months of observation, the symptoms of disease were—a cachectic, anæmic appearance, inability to exert himself, profuse diaphoresis, so that he often expressed himself as "coming out of a fishpond, every morning;" slight muscular pains in the legs, especially after resting awhile, and occasional rigors. He made a good recovery eventually, like all the others.

On admission, this man was ordered an emetic followed by the imperial drink. Calumba, quinine, and iron were exhibited during the first month. On the 7th, 9th, and 11th of May, he had opium at bedtime. From the time he embarked for Canada to some weeks after his arrival, he had no medicine whatever. Subsequently he was taking eight grains of citrate of iron and quinine daily, three times, for several weeks. He got as much nourishment all through as he could take.

I have now detailed the four cases which were subjected to the closest observation. I may quote a few more, however :—

Case 5.—Private J. L., aged 37, service 17 years, was admitted into hospital on the 7th of June, 1866. He had suffered from ague in India. Symptoms, on admission, were those of general malaise, with slight pyrexia, muscular

tremors, constipation, white tongue, quick pulse. Ordered a saline purgative, followed by a mixture of chamomile, quinine, and gentian.

On the sixth day, he was very much debilitated, and sweated profusely; temperature 100°, pulse 92. From this to the 17th day there are various records of profuse diaphoresis, high temperature, and quick pulse, great debility, anorexia, and slight deafness. He was truly a miserable, dejected looking being. During the fourth week there was decided amendment. On the 46th day, he was discharged from hospital, but was readmitted in a fortnight with symptoms of great debility. In 24 days he was sent to the Sanitarium at Citta Vecchia, where, after some months, he quite recovered. Very few observations were taken of his temperature, but I find twenty over 100°. He was allowed good diet: ale, wine, beef tea, and eggs, and bitter tonics were given. He made an excellent recovery.

Case 6.—Private R. S., aged 24, service three years, was 97 days under observation before his temperature, twice recorded daily, fell below 99°. He also suffered from profuse diaphoresis, and had, more or less, bronchitis from first to last; his temperature was frequently 103°. I find it was 103·4° on the 71st day of his fever. His pulse showed great debility, thus, on the 19th day it was 86 lying, 100 sitting, and 140 standing; on the 22nd day, 88 lying, 96 sitting, and 120 standing. He was sent to Citta Vecchia after three months in the Regimental Hospital. He recovered well.

Case 7.—An officer of the regiment was obliged to go on the sick-list in May, shortly after arrival of regiment at Fort St. Elmo. He suffered from a mild form of the fever; the symptoms were so exactly similar to those described by Dr. Marston in his own case, that my description of them would seem but a copy of that given by the latter in the Medical Reports for 1861. This officer was ill for 68 days. He embarked for Canada in a state of great debility, general malaise, and depression. He had nearly recovered when he arrived at Gibraltar, and quite so by the time we reached the Azores. He is now strong and well.

Case 8.—A married woman was attacked with this fever in June 1866, and came under my observation on the 1st July. Until the middle of September I visited her daily. The symptoms were very similar to those of the cases already described. Great debility and depression of spirits were the most prominent, but she suffered also from bronchitis, and for a few days from slight laryngitis. I suspected phthisis, but of course failed to discover the physical signs. After 25 days' observation, she appeared like the others to be convalescing, but it was, as usual, deceptive. About the 60th day of fever I find records of temperature averaging 101·5°, of pulse over 100, and respirations over 30. I estimated the total duration to be over 90 days. She made an excellent recovery, and is now, like all the other subjects of this fever, strong and well. Tonics, stimulants, and nourishment constituted the treatment.

During the greater part of her illness she was placed under most unfavourable conditions, having a helplessly sick child in the same room with her. She was very poor, and although very kindly treated by the officers' wives, she had at best but a miserable time of it.

There are four more cases concerning which I would make a remark. Two of them were intermediate in character between typhoid and "Mediterranean remittent" and two of them between the latter and Maltese fever. I may say that the fevers which we had the opportunity of observing in Malta would defy classification. If accurate records had been instituted in all, a Table might be constructed showing cases of from 24 hours to as many weeks' duration, in which the symptoms varied from the acute sthenic pyrexial through all the intermediate stages, down to the adynamic typhoid, and who would venture with our present knowledge to draw the lines of distinction, etiological or pathological.

Case 9 was one of this doubtful description. It was that of a young soldier of three years' service, who had a fever of about 44 days' duration. Upwards of 50 observations on his temperature varied from 100·2° to 103·6°, pulse almost invariably above 100, respirations over 30. He suffered from broncho-pneumonia, and great prostration of strength. He reached the threshold of death, but did not pass it. He had not any spots of any description on his body. I find the remark "17th day. This patient has a particulary clear white skin, so

that any spots must be seen." About this time the heart's sounds and impulse were almost imperceptible, and the evacuations were passed involuntarily. Subsequently he suffered from aberation of intellect; he reasoned right from wrong premises, and lastly he had bed sores and abscesses in the scalp. He gradually made a good recovery.

Now this man was supposed to have typhoid fever. Well, if he had, a man may be afflicted with it, and have no spots on his skin; very little diarrhœa, and the quotidian vacillations of temperature looked on as so characteristic of the defervescence of typhoid, may be absent also. Yet he had not the common symptoms of the "remittent" either. He had typhoid *symptoms*, which I have not seen in the latter, nor have I seen in it, other than a very white or clean tongue; aberation of intellect is very unusual, and bed sores I have not seen in the most protracted cases. Again, this man's temperature, like the next case, scarcely ever differed to the amount of one degree between morning and evening. In the "Mediterranean remittent" there is always at least this difference.

Case 10 might almost be described as the last; both men of about the same age, 21; the same service, 3 years; the same time on the station, 14 months; admitted during the same month, September 1866. This patient certainly had spots of a rose-colour, lenticular, and fading on pressure, on the abdomen, chest, and back, during the second and third weeks of his illness, and the diarrhœa was more severe, and more characteristic. Still the diagnosis was doubtful. On the 9th, 10th, and 11th days of his fever, the temperature was below 103°, and according to Wunderlich, this is very uncommon in typhoid fever. Again, there were no characteristic quotidian vacillations; the defervescence was by a lysis of weeks' duration. Fever lasted 34 days. He made an excellent recovery.

We had also cases intermediate in character between the remittent and the short Maltese fever. The following are two examples:—

Case 11.—A stout, healthy, young soldier became the subject of fever in August 1866. Throughout he had all the symptoms of high pyrexia, but in place of their disappearing in from seven to eleven days, they lasted for 18, and then his convalescence became thoroughly and permanently established in a similar manner.

Case 12.—This patient was admitted in May 1867. He was supposed to be the subject of the Maltese fever then so prevalent, and was treated exactly in the same manner as the other fever cases in hospital. It persisted, however, for 17 days, with considerable sweating, and then disappeared completely, and he rapidly got strong and well.

So far concerning the "gastric remittent fever" of the Mediterranean.

That it is a fever, *ab initio*, appears from the fact that at the outset there is no local complication, and when in the more advanced stages of the disease they occur; they appear to be the result of blood poison, and they subside as the latter in course of time becomes eliminated. It is excluded at once from the class of exanthemata; it remains, therefore, to find whether we shall place it amongst the continued, the relapsing, or the paroxysmal fevers.

That it has any alliance with the latter appears to me very doubtful. It is now believed that vegetable decomposition is not necessary to the production of malarial poison, but at the same time it is such a very common accompaniment of the latter, that it is worth mentioning, that there exists no such cause, or usual accompaniment of periodic fevers in Malta. The vegetation is there very scanty, and there is not a river, a marsh, or a lake in the whole island, against whose barren rocks the pure deep sea rolls its waves, leaving behind it not malarial-breeding organisms, but quantities of the common salt, in which it abounds. True it is that at the ends of the secluded inlets of the harbours, the smell is at times most offensive, but this is caused by putrifying animal remains and fœcal matters of all descriptions.

This fever has not the characteristics of any of the intermittents or remittents that have ever been correctly described as such. There is no alternation of cold, hot, and sweating stages. It is as monotonous in its course as it is insidious and gradual in its onset. There is no such thing as a quotidian, tertian, or quartan remission, or abatement of symptoms, nor in this respect is there even an approach to the characters of the eratic forms of periodic fevers.

We must remember that nearly all the intermittents and remittents that have been described have been diagnosed by signs and symptoms without the more accurate means which we now possess. It is, therefore, a fact that in all such fevers there must be an abatement or remission cognizable to ordinary medical observation.

Now from my observations I should say that one of the great characteristics of the fever in question is *sameness*. Hour after hour, and day after day, and week after week recur the baffled hopes of the doctor and his patient. And the exceptions to this monotony in the way of apparent amendments, exacerbations or complications defy any arrangement as to periodicity. If quinine is indicated, our first thoughts must be when is it to be given? At what time does the remission, intermission, or exacerbation occur, at what hour, on what day, in what week? To such questions, in such cases, I could never find an answer.

Doubtless there is an evening exacerbation of temperature, but in what febrile disease is there not? Pneumonia, the recognized continued fevers, erysipelas, &c., we do not call remittents, because the evening temperature is mostly one, two, or more degrees higher than the morning, nor is the fever in question either, on such grounds. Something else is necessary to constitute a remittent. It would seem needless to say so, but the fact alluded to has been adduced as a prop to the argument that it is, and as a proof that quinine is indicated. If such is true our consumption of antiperiodic remedies must soon become immense.

I certainly must admit the fever is *remittent* in this way—that there are regular evening elevations of temperature; but as the term is at present, and has been hitherto, interpreted, we are not justified in applying it. As the exponent of a fact *common to all fevers* it is properly used, but as a differential it is misapplied.

I would further state that the most typical cases of this fever occurred in a fort almost entirely surrounded by the sea, and at a time of the year when the approximate mean temperature of the month did not exceed 60·2° F., and during an unusually dry season—in fact during a long drought which had lasted for several months.

There is nothing in common between this fever and that called "relapsing." It appears to be quite as well entitled to the name "continued" as it is to "remittent," in fact more so; but when we have a few hundred cases carefully observed and recorded, and temperatures accurately taken, we may be able to settle the question—not till then.

One significant fact deserves mention. Ensigns L. and S. (Cases 1 and 2) became ill in the beginning of January 1867. They occupied the new officers' quarters in Fort Riccasoli, which consisted of sixteen rooms arranged in two storeys, eight on each. The rooms occupied by these officers were situated at each end of the upper storey. The water-closets were also at the end of each storey; and thus the rooms in question (each of which had a door at the back) had immediately behind them, about one yard distance, two water-closets. Now in the commencement of January there was an unusual drought; the water everywhere was scarce, and the supply for these water-closets was entirely cut off. Hand flushing was directed, but I have reason to know that it was not efficiently carried out, and that accumulations of soil in the pans and in the sewer for several days, more than once occurred about this time. Case 8 was assigned by the "neighbours" to the very filthy habits of the subject. I was told that the evacuations were allowed to remain in her room until the place became offensive and intolerable to the people around. A remediable cause existed, which would render not at all unlikely such an occurrence. This, however, was duly and forcibly represented in the proper quarter.

In connection with the subject of this paper, I must notice here an endemic of fever, of an average duration of 19 days, which prevailed in Fort Riccasoli during the months of September and October 1866. Children under 12 years of age were remarkably susceptible of it. It generally commenced with drowsiness, langour, anorexia, prostration of strength, hurried breathing (over 44), hot skin (104°, 105°), white tongue, quick pulse and frontal headache, and sometimes, but not often, diarrhœa.

The temperature during the first week of observation varied from 104° to

105° F., by the end of the second week it usually fell to 100°, and by the end of the third convalescence was established. In the earlier stages of the disease, the morning and evening temperatures seldom differed more than 1·5°; but towards the decline the excess of the evening over the morning observations was much greater, amounting frequently to 4°, and in one case to 7·4°. (See Case C, diagram.) It occurred in the case of a boy aged 12 years, on the 20th day of the fever; the morning temperature was 96°, and in the evening it had risen to 103 6°. On the 21st day the evening temperature was 101°, on the 22nd 99°, and on the 23rd the normal stability was established.

The pulse at the commencement was invariably over 100, frequently 120 and 130; and it fell very slowly, in no case reaching the normal when the temperature showed complete absence of fever. This was very important, as indicating the substitution of tonics and good diet in place of febrifuges and liquid nourishment.

The respirations in the earlier stages were always hurried, from 40 to 48 per minute. At the period of convalescence they had generally fallen to 30.

The condition of the skin varied much: generally very dry throughout the fever; and in such cases innumerable sudamina covered the whole of the trunk, especially anteriorly and superiorly. In one case they appeared profusely on the neck and head. This enormous crop persisted until the 18th day, and a few were still present on the 23rd. The presence of this eruption in this endemic was very remarkable. It appeared to be a perverted mode of the natural secretion, which, from some abnormal condition of the cuticle, instead of dispersing by evaporation, was retained until attrition and pressure destroyed the minute vesicles, and allowed its escape.

It was remarked that sudamina appeared only on those persons whose personal cleanliness was neglected. Unfortunately there were many.

The tongue was first coated with thick white fur; it then passed into a strawberry condition, from which it gradually cleaned, or became dry, small fissured, and covered with black sordes, subsequently cleaning.

Thirst was early much complained of, and the patient throughout the fever eagerly drank water or acidulated drinks. Solid food was not tolerated.

Profuse diarrhœa occurred occasionally; obstinate constipation as often persisted.

Slight delirium was present in a few cases. Deafness was very common. Frontal headache existed during the first week or ten days. The general absence of insomnia was remarkable. More or less bronchitis was present in all cases.

A few patients went down to the verge of death, almost beyond hope—a condition in which there was profuse diarrhœa, with tormina and tenesmus; a small, black, contracted, dry tongue; a small, thready, rapid pulse; cardiac impulse imperceptible, and systole scarcely to be heard; subsultus and flocculatio.

Others passed through the whole fever without making a single complaint, even with a temperature of 105°, sleeping well at night, and daily expressing themselves "better."

One case proved fatal on the 14th day. The child was three years old. Her mother and two sisters (Cases D and E) were prostrated by the fever at the same time in the same room. They were, with three other severe cases, as quickly as possible moved into large marquee tents erected for their reception on the parade-ground. The six cases made good recoveries.

The convalescence, in most cases, was rapid and complete, the patients quickly gaining flesh when allowed to move about and take solid food. In one case, however, very large abscesses formed in the scalp, and protracted recovery over several weeks.

The treatment of all the cases was simple. An ounce of the bitartrate of potash, with the juice of two or three lemons, in two pints of water, were given daily. In one case half a drachm of compound rhubarb powder, in another a few ounces of tincture of squills, were administered. Two or more pints of milk were daily allowed, and constituted the chief portion of food taken. In some cases no stimulants whatever were given; in others, where the pulse and cardiac action indicated, from 5 to 10 ounces of wine were daily administered. If head symptoms were troublesome, the hair was cut. If local pain indicated warm cataplasms were applied to the thorax or abdomen.

I had altogether about twenty cases during this endemic, with carefully recorded observations, which I took twice daily. I regret very much to say that, with many others, they were lost by an accident. I can, however, give six diagrams from the Case-book; and the above description of the fever is an abstract of my notes made at the time.

To conclude this paper: what is meant by the "Gastric remittent fever of the Mediterranean"? It is a fever most irregular in its course, and most protracted in duration, characterised by dyspeptic symptoms, accompanied by profuse diaphoresis or sudamina, without exanthematous eruption, and followed by anæmia eventually, and almost invariably ending in complete recovery.

TABULAR View of 67 Cases of "Maltese Fever" which occurred in Lower Fort St. Elmo amongst the Men of the 29th Regiment during the months of March, April, May, and June, 1867.

[To face page 492.

Numbers.	Company.	Rank and Names.	Years of Age.	Years of Service.	Date of Admission.	No. of Days in Hospital.	Duration of Fever.	Highest Temperature Reached, and the Day on which it occurred.	Prominent Symptoms.	Remedies Employed.	Died or Recovered.
1	F	Private J. Barry	21	2	25·2	14	11	103·2 on the even. of the 3rd	Intense frontal Headache. Bilious Vomiting and Jaundice	Emetic and I. Drink * Pot. Acet. and Nit.	R.
2	B	" W. Lavender	19	2	26·6	11	11	102·6 " " 3rd	Insomnia	Citric Acid. Potass Acet.	R.
3	G	" J. James	26	3	12·3	13	10	103·4 " " 4th	Pains in Legs	Emetic and I. Drink	R.
4	A	" R. Maulle	27	7	1·6	9	10	102·8 " " 4th	Very yellow furred Tongue. General Pains	No Medicine	R.
5	F	" T. Farrell	27	9	4·6	12	9	103·2 " " 4th	Suffused Eyes. Thirst	"	R.
6	G	" W. Wall	34	10	18·6	13	9	104·2 " " 4th	Severe Rigors. Profuse Diaphoresis. Jaundice	Emetic and I. Drink. Jal. Co. ‖	R.
7	A	" J. Cryan	25	7	1·4	12	9	103·2 " " 4th	Extreme Nervous Apprehension. Pulmonary Distress. Cough	Emetic and I. Drink. Inf. Calumbar	R.
8	F	" G. Rigby	19	2	11·5	11	9	102·4 " " 4th	Pain in Calves of Legs. Epistaxis. Pulse, on admission, 148	Emetic and I. Drink. Liq. Opic. Sod.	R.
9	G	" W. Cottle	20	7	14·6	10	9	102·2 " " 4th	Slight Deafness	Emetic and I. Drink. Liq. Opic. Sod.	R.
10	H	" W. Sooper	26	7	19·4	10	9	102·3 " " 4th	Usual Symptoms	Emetic. Liq. Opic. Sod. Quinine	R.
11	C	" J. Naylor	28	7	30·3	13	9	103·2 " " 3rd	Usual Symptoms	Emetic and I. Drink. Quinine	R.
12	A	" J. Fincher	25	7	26·4	16	9	101·4 " " 3rd	Bilious Vomiting. Diarrhœa. Suppression of Urine. Thirst. Bronchitis	Emetic and I. Drink	R.
13	I	" R. Lyndsay	26	7	10·5	12	8	104·2 " " 3rd	Frontal Headache. Rigors. Constipation. Hepatic Tenderness. Jaundice	Emetic and I. Drink	R.
14	I	" J. Wood	28	9	2·5	10	8	103· " " 3rd	Bilious Vomiting. Debility. Obstinate Constipation	Emetic. Liq. Opic. Sed. Mist. Purgans	R.
15	C	" C. Mead	30	9	19·5	10	8	104· " " 3rd	Tonsillitis. Jaundice. Pain in the Calves of Legs. Epistaxis. Retention of Urine	Emetic. Potass. Acet. and Nitrate	D.
16	D	" J. Walmsly	28	2	22·4	9	8	103·2 " " 3rd	Slight Pulmonary Distress. Epistaxis	Emetic and I. Drink. Inf. of Quassia	R.
17	E	" C. Corbett	20	2	4·5	9	8	104·2 " " 3rd	Bilious Vomiting. Anorexia. Subcuticular Red Rash	Emetic and I. Drink	R.
18	D	" T. Phillips	25	7	7·6	9	8	103·6 " " 3rd	Tonsillitis. Loss of sense of Taste. Thirst	Emetic and I. Drink	R.
19	C	" J. King	24	8	15·3	8	8	104·6 " " 4th	Very rapid Pulse, on admission 152. Sitting Debility	Emetic and Acid Drinks	R.
20	E	" J. Neal	19	7	18·3	8	8	103·6 " " 3rd	Frontal Headache	Emetic and I. Drink. Bromide of Potassium	R.
21	G	" J. Bolson	24	7	21·6	8	8	103·6 " " 3rd	Frontal Headache. Pulse 140 on Admission	Emetic and I. Drink	R.
22	F	" W. Ray	31	7	17·2	12	8	102· " " 3rd	Mild Bronchitis. Anorexia	Emetic and I. Drink. Tinct. Hyociami.	R.
23	E	" R. Kane	38	20	26·4	16	8	102· " " 3rd	General Pains. Rigors. Jaundice	Calomel Emetic and I. Drink. Pill. Rhei Co.	R.
24	B	" R. Evans	26	8	14·4	10	7	103· " " 3rd	Pulmonary Distress. Jaundice. Retention of Urine	Emetic and I. Drink	R.
25	A	" J. Gannon	23	7	16·6	10	7	103· " " 3rd	Anæmlice. Bilious Vomiting. Tonsillitis	Emetic and I. Drink	R.
26	F	" J. Western	22	6	17·3	8	7	102·8 " " 3rd	Rigors. Vertigo. Epistaxis	Warm Baths. Inf. of Calumbar	R.
27	G	" J. Jones	23	4	25·3	8	7	103·4 " " 4th	Frontal Headache. Tonsillitis	Emetic and I. Drink	R.
28	H	" M. White	20	2	15·4	8	7	104·6 " " 3rd	Frontal Headache. Diarrhœa. Bilious Vomiting	Emetic and I. Drink	R.
29	C	" T. Greenalch	25	8	21·4	8	7	102·6 " " 3rd	Usual Symptoms	Emetic and I. Drink	R.
30	E	" R. Smith	24	5	23·4	8	7	104· " " 3rd	Pains in Legs	Emetic and I. Drink	R.
31	H	" H. Pike	24	7	12·6	8	7	103·4 " " 3rd	Severe Frontal Headache	Emetic and I. Drink	R.
32	D	" C. Barden	20	2	23·4	6	7	102·4 on the morn. of the 3rd	Bilious Vomiting. Frontal Headache. Severe Rigors	Emetic	R.
33	G	" J. Spears	22	3	12·5	9	7	104·2 " " 3rd	Rigors. Thirst. Frontal Headache. Diarrhœa	Emetic. Liq. Opic. Sed.	R.
34	B	" J. Hughes	23	6	13·3	8	7	102·4 " " 3rd	General Pains, especially in Calves of Legs	Emetic and I. Drink. Bismuth	R.
35	K	" V. De Illewell	35	7	19·5	8	7	102·4 " " 4th	Frontal Headache	Emetic and I. Drink. Leeches to Temples	R.
36	C	" M. Kavanagh	38	19	22·4	5	7	102·2 on the morn. of the 3rd	Usual Symptoms	Inf. of Columbar	R.
37	G	" J. Osborne	22	5	27·6	6	6	102·2 on the even. of the 4th	Anæmlice. Convulsions. Suppression of Urine	Emetic and I. Drink, &c.	D.
38	H	" H. Cannon	22	2	28·3	8	6	102·4 " " 3rd	Usual Symptoms	Emetic and I. Drink	R.
39	C	" J. Pack	22	2	20·5	8	6	102·4 " " 3rd	Usual Symptoms	Emetic and I. Drink	R.
40	C	" J. Mullaly	25	8	27·5	7	6	101· " " 3rd	First Symptoms. Nocturnal Diaphoresis	Emetic and I. Drink. Inf. of Quassia	R.
41	1st Bat. Rifle Brig.	" R. Johnson	28	8	10·5	6	6	102·6 " " 3rd	Usual Symptoms	Emetic and I. Drink	R.
42	H	" P. McGough	40	17	12·5	7	6	103·2 " " 3rd	Usual Symptoms	Emetic and I. Drink	R.
43	F	" J. Rowlon	23	5	14·6	7	5	103·2 " " 3rd	Usual Symptoms	Potass. Acet. and Nit.	R.
44	G	Corporal D. Harwood	27	9	19·5	10	5	102· " " 4th	Usual Symptoms	Emetic and I. Drink	R.
45	H	Private J. Warden	27	9	28·3	7	5	103·2 " " 3rd	Pulmonary Distress. Cough	Mustard Emetic and I. Drink to Chest	R.
46	F	" P. McDonagh	40	18	10·4	7	5	101·4 " " 3rd	Usual Symptoms	Emetic and I. Drink	R.
47	H	" J. Wilkinson	34	9	22·3	6	5	104· " " 3rd	Debility. Constipation	Emetic and I. Drink	R.
48	A	" H. Smith	25	8	13·5	6	4	102· " " 3rd	Frontal and Hepatic Pains. Rigors	Emetic and I. Drink	R.
49	A	" O. Conway	24	7	9·4	7	4	102·2 on the morn. of the 3rd	Usual Symptoms	Emetic and I. Drink	R.
50	F	" W. Turner	24	6	9·4	7	4	103·2 on the even. of the 2nd	Great Thirst and very rapid Pulse	Emetic and I. Drink	R.
51	E	" J. Butler	26	6	23·5	5	4	102· " " 2nd	Usual Symptoms	Saline Purgative and I. Drink	R.
52	E	" D. Murphy	26	5	6·6	5	4	102· " " 2nd	Frontal Headache. Pains in Calves of Legs. Constipation	Emetic and I. Drink	R.
53	C	" J. Mannion	26	7	30·3	4	4	101·4 " " 2nd	Usual Symptoms	Emetic and I. Drink	R.
54	A	" J. Wood	40	25	30·4	4	4	100·4 " " 2nd	Rigors. Frontal Headache. Debility. Scanty Urine	Pulv. Jalap Co. Quinine	R.
55	B	" J. McKew	29	9	3·4	4	3	102·8 " " 2nd	Usual Symptoms	Emetic and I. Drink	R.
56	F	" J. Mooney	27	8	5·4	8	3	102·2 " " 2nd	Usual Symptoms	Emetic and I. Drink	R.
57	G	" J. Hunter	22	4	26·4	4	3	100·4 on the morn. of the 2nd	Usual Symptoms	Emetic	R.
58	H	" R. Barker	22	4	19·3	4	3	100·3 " " 2nd	Usual Symptoms	Emetic	R.
59	C	" M. Cleary	25	7	20·5	4	3	101·2 " " 2nd	Usual Symptoms	Mist. Purgans	R.
60	A	" J. Bruton	29	9	3·4	4	3	102·2 on the even. of the 2nd	Usual Symptoms	Light Diet and Co.	R.
61	B	" B. Stamford	23	6	15·3	4	3	103·8 on the morn. of the 2nd	Slight Jaundice	Emetic and I. Drink	R.
62	D	" J. Dunkley	20	7	19·3	3	3	103·4 on the even. of the 2nd	Usual Symptoms	Emetic and I. Drink	R.
63	D	" J. Morris	23	6	30·3	5	2	102·8 " " 2nd	Usual Symptoms	Emetic and I. Drink	R.
64	D	" J. Barry	29	6	6·4	6	2	101·2 " " 2nd	General Pains	Rhei and I. Drink	R.
65	C	" J. Gannon	20	6	18·5	4	2	101·2 " " 2nd	Usual Symptoms	Emetic and I. Drink	R.
66	C	Corporal J. Kenny	27	7	21·5	3	2	101·2 on the morn. of the 2nd	Rigors. Great Thirst	Emetic and I. Drink	R.
67	C	Private G. Solway	29	12	22·5	3	2	100·6 on the even. of the 2nd	Usual Symptoms	Inf. Calumbar	R.
		Averages	26	7	8	6		102·6 on the even. of the 2nd	Usual Symptoms	Mist. Scillæ	R.

Actual Daily Temperature.

Day of Disease.	1		2		3		4		5		6		7		8		9		10		11		12		13		14	
Time of Day.	M.	E.	M.	E.	M.	E.	M.	E.	M.	E.	M.	E.	M.	E.	M.	E.	M.	E.	M.	E.	M.	E.	M.	E.	M.	E.	M.	E.
1	..	..	101·5	102·	101·6	103·2	101·2	101·3	100·5	100·2	99·6	100·	99·4	100·5	99·8	99·6	99·	100·	98·8	100·2	98·2	99·2	98·2	98·8	98·2	98·4	98·	..
2	..	..	101·6	102·4	102·2	102·6	99·2	..	..	..	..	..	..	..	..	..	98·	100·	98·8	99·2	98·8	99·8	98·4	98·5	..	..	..	..
3	..	..	100·5	100·	101·8	102·	100·2	103·4	100·8	101·8	102·4	102·4	100·8	101·2	100·	101·2	98·8	100·	98·6	98·4	98·8	98·4	98·2	98·8	98·2	98·4	98·6	..
4	..	..	..	..	..	..	100·6	102·8	99·8	100·	100·6	101·2	98·4	99·8	98·6	99·6	98·2	..	..	..	..	..	..	..	..	..	..	..
5	..	..	100·8	101·	100·2	101·	100·8	99·4	100·2	100·8	101·	..	99·6	100·2	101·2	101·2	99·2	101·4	98·6	..	98·6	..	98·6	..	98·8	..	98·8	..
6	..	..	102·	104·2	102·8	102·2	98·8	100·6	99·2	100·	98·4	99·	98·8	100·4	98·8	100·2	98·8	99·	98·6	..	98·6	..	98·6	..	98·8	..	98·8	99·2
7	..	..	..	..	100·2	103·	101·4	101·8	101·6	103·2	101·	101·8	100·2	100·6	99·2	98·8	98·4	99·6	98·4	98·6	98·	98·4	98·2	98·4	98·2	98·4	98·	..
8	..	..	101·2	102·4	101·8	101·2	100·8	101·	99·8	102·4	98·8	100·6	99·6	100·6	99·2	100·8	98·6	99·6	98·6	98·2	98·4	98·2	98·6	98·6	98·2	98·4	98·	99·2
9	..	101·	102·4	102·8	102·2	98·8	100·6	101·2	99·8	100·2	98·6	100·2	98·6	100·2	98·8	100·2	98·8	99·	98·8	98·4	98·6	98·4	98·4	98·6	98·4	98·6	98·6	98·8
10	..	..	102·6	104·2	102·8	102·2	98·6	100·6	99·2	90	98·4	99·	98·8	100·4	98·8	100·6	98·8	99·	98·8	98·6	98·6	98·4	..	..	..	..	..	..
11	..	..	100·2	103·	101·4	101·8	101·6	103·2	101·	101·8	100·2	100·6	99·2	100·6	98·2	98·8	98·4	99·6	98·4	98·6	98·	98·4	98·2	98·4	98·2	98·4	98·	99·2
12	..	..	101·2	102·4	101·8	101·2	100·8	101·	99·8	102·4	98·8	100·2	98·6	100·2	98·8	100·2	98·8	99·	98·6	98·4	98·6	98·4	98·2	98·4	98·2	98·4	98·	..
13	..	..	101·8	102·6	102·2	102·2	101·6	99·4	98·8	99·	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	..	..	102·	102·	102·2	99·6	102·	99·8	101·6	101·2	100·4	100·6	98·2	99·4	98·2	98·2	98·4	99·	98·4	98·2	98·4	98·6	98·6	98·4	98·6	98·6	98·6	98·2
15	..	..	102·2	102·2	102·2	99·6	102·	99·8	101·6	101·2	100·8	100·6	101·2	100·8	100·6	101·8	99·8	99·	99·2	98·6	98·6	98·4	98·6	98·4	98·6	98·4	98·6	98·6
16	..	..	100·4	101·2	101·	101·4	100·8	100·	99·	98·6	98·2	99·4	98·2	98·2	98·2	99·2	98·4	99·	98·4	98·2	98·4	98·4	98·6	98·6	98·4	98·8	98·6	98·2
17	..	..	102·4	104·	99·6	102·	103·2	103·2	99·8	100·	99·2	99·4	98·8	100·6	99·	98·4	98·2	98·	98·	98·6	99·2	..	..	..	..	..	..	..
18	..	..	101·6	103·2	100·	100·8	101·4	101·2	99·2	100·2	99·6	100·	99·2	99·8	99·4	98·8	98·6	98·4	..	..	..	..	..	..	..	..	..	..
19	..	..	101·8	99·2	100·6	104·2	100·8	100·2	101·4	100·2	100·4	99·8	100·8	98·4	99·	98·6	98·4	98·2	..	..	..	..	..	..	..	..	..	..
20	..	..	..	..	100·2	101·2	103·2	103·6	100·6	103·4	99·	102·	99·2	101·2	98·8	99·	98·4	98·2	98·4	98·4	98·4	98·4	..	..	..	..	..	..
21	..	..	100·2	104·4	101·8	103·	101·6	104·4	103·4	104·6	99·4	101·2	100·	100·8	99·2	99·	..	..	..	..	..	..	..	..	..	..	..	..
22	..	..	..	..	101·8	103·6	101·4	102·8	101·2	103·4	99·4	100·2	98·2	100·6	98·8	100·2	98·6	98·4	98·2	..	..	..	..	..	..	..	..	..
23	..	..	102·2	103·6	101·8	102·6	101·2	103·	99·	101·2	99·2	99·4	98·2	99·2	98·6	99·	98·2	..	..	..	..	..	..	..	..	..	..	..
24	..	..	102·8	102·4	100·2	103·	99·6	101·	99·6	101·2	99·4	100·2	98·6	100·2	98·6	98·8	98·2	99·4	98·6	..	..	..	..	..	..	..	..	..
25	..	..	102·4	101·8	100·2	102·8	99·4	101·2	99·6	100·2	99·4	100·2	98·4	100·2	98·6	98·8	98·2	98·4	98·2	..	..	..	..	..	..	..	..	..
26	..	..	102·6	101·8	100·2	102·8	99·4	101·2	99·2	100·2	99·4	100·2	98·4	100·2	98·6	98·8	98·2	98·4	98·2	..	..	..	..	..	..	..	..	..
27	..	..	102·6	101·8	100·2	101·4	102·8	101·2	99·4	100·2	99·2	100·4	99·	100·2	98·4	98·6	98·4	98·6	98·2	98·4	98·2	98·4	..	..	..	..	..	..
28	..	..	103·8	101·4	102·2	101·4	102·8	103·2	100·4	100·6	99·4	100·2	98·4	100·2	98·6	98·8	98·2	98·4	..	..	..	..	..	..	..	..	..	..
29	..	..	102·6	104·6	100·2	103·2	99·8	101·6	100·4	100·6	99·4	100·2	98·6	100·2	98·8	98·6	98·4	..	..	..	..	..	..	..	..	..	..	..
30	..	..	..	102·6	101·8	100·8	101·2	100·4	99·6	100·8	99·8	101·	99·2	99·	98·4	98·6	98·	..	..	..	..	..	..	..	..	..	..	..
31	..	..	101·8	102·4	100·	104·	101·2	102·2	100·8	..	99·2	99·4	98·2	98·6	98·4	98·6	..	..	..	..	..	..	..	..	..	..	..	..
32	..	..	101·4	103·4	100·6	102·4	99·8	101·4	98·6	101·2	99·8	100·	99·2	98·4	98·	..	..	..	..	..	..	..	..	..	..	..	..	..
33	..	..	101	100·2	99·	100·2	98·6	100·	98·	99·4	99·	99·8	98·	99·2	98·	..	..	..	..	..	..	..	..	..	..	..	..	..
34	..	..	..	..	100·8	102·4	100·4	100·6	100·2	101·4	98·8	100·	98·6	99·	98·6	..	..	..	..	..	..	..	..	..	..	..	..	..
35	..	..	102·4	104·2	99·4	103·	101·6	102·8	98·6	100·2	98·4	99·2	98·6	98·6	98·	..	..	..	..	..	..	..	..	..	..	..	..	..
36	..	..	101·	99·6	100·2	102·	101·4	102·8	100·8	102·4	99·4	99·2	98·6	101·4	98·6	99·	98·6	98·8	98·2	98·4	..	..	..	..	..	..	..	..
37	..	..	..	..	..	..	..	..	..	..	100·6	101·6	99·2	100·4	98·4	99·6	98·8	98·2	..	..	..	..	..	..	..	..	..	..
38	..	..	..	..	103·2	99·	98·6	102·	101·2	100·4	99·8	100·	99·4	100·2	98·6	98·	98·4	98·	..	..	..	..	..	..	..	..	..	..
39	..	..	102·4	102·6	98·8	100·6	98·6	102·4	100·4	99·6	99·8	100·	99·2	..	98·4	98·6	..	..	..	..	..	..	..	..	..	..	..	..
40	..	..	101·6	103·4	100·2	102·4	99·8	101·4	98·6	101·2	99·8	100·	99·2	98·4	98·	..	..	..	..	..	..	..	..	..	..	..	..	..
41	..	..	102·6	104·8	99·6	102·6	99·4	102·4	98·8	99·	98·4	100·6	99·	98·2	98·	98·2	98·	..	..	..	..	..	..	..	..	..	..	..
42	..	..	99·6	100·	99·2	101·	99·	99·6	99·6	99·8	98·8	99·2	98·8	98·8	98·4	..	..	..	..	..	..	..	..	..	..	..	..	..
43	..	..	101·8	102·4	99·4	102·	98·8	102·6	98·6	101·	98·8	99·2	98·	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
44	..	..	99·2	99·	98·4	103·2	99·	99·2	98·8	99·2	98·2	99··	98·2	98·4	98·2	..	..	..	..	..	..	..	..	..	..	..	..	..
45	..	..	101·4	102·2	99·4	101·	99·2	103·2	98·6	99·2	98·8	98·6	98·2	98·4	98·	..	..	..	..	..	..	..	..	..	..	..	..	..
46	..	..	..	101·4	100·6	102·	99·4	99·	98·4	99·2	98·6	98·6	98·2	98·4	98·4	..	..	..	..	..	..	..	..	..	..	..	..	..
47	..	..	101·4	102·6	99·4	101·	99·2	102·2	98·6	99·2	98·6	98·6	98·2	98·6	98·4	..	..	..	..	..	..	..	..	..	..	..	..	..
48	..	..	..	..	100·6	101·	98·8	99·	99·2	98·4	98·4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
49	..	..	..	..	100·2	101·	99·4	101·8	99·	99·6	98·4	98·6	98·2	98·4	98·2	..	..	..	..	..	..	..	..	..	..	..	..	..
50	..	..	101·	102·	99·6	100·	99·2	100·2	98·4	99·6	98·6	98·6	98·2	98·4	98·2	..	..	..	..	..	..	..	..	..	..	..	..	..
51	..	..	102·2	103·	99·2	100·4	99·2	100·	98·6	98·6	98·4	98·6	98·4	98·6	98·4	..	..	..	..	..	..	..	..	..	..	..	..	..
52	..	..	102·	103·8	100·2	100·4	99·	99·6	98·6	98·4	98·4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
53	..	..	101·8	102·	100·6	99·	99·4	99·	98·2	98·6	98·	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
54	..	..	101·8	102·	100·6	100·2	99·4	99·	98·2	98·6	98·6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
55	..	..	100·8	101·4	100·2	99·4	99·2	99·4	98·4	98·6	98·6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
56	..	..	98·8	100·4	99·4	98·8	98·8	99·6	98·4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
57	..	..	102·6	102·8	100·4	101·6	98·4	98·4	98·2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
58	..	..	102·2	102·8	99·6	100·	98·	98·4	98·6	98·6	98·6	98·6	98·2	98·6	98·4	98·4	..	..	..	..	..	..	..	..	..	..	..	..
59	..	..	100·4	99·6	100·	98·6	98·2	98·6	98·2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
60	..	..	100·2	100·4	98·2	99·2	98·	98·6	98·	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
61	..	..	101·2	100·4	99·	99·2	98·2	98·4	98·2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
62	..	..	101·6	102·2	99·	98·8	98·8	98·6	98·	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
63	..	..	100·6	99·4	98·4	99·	98·4	98·6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
64	..	..	102·6	103·4	100·2	99·	98·2	98·6	98·2	99·6	99·2	98·6	98·4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
65	..	..	..	102·8	98·6	99·4	98·2	98·4	98·2	98·4	98·4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
66	..	..	99·6	100·2	98·6	98·6	98·4	98·6	98·2	98·4	98·4	98·6	98·4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
67	..	..	101·2	100·8	98·2	98·	98·2	98·4	98·	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	100·6	99·2	98·6	98·2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	101·4	102·	100·3	101·3	101·3	100·8	99·3	100·3	99·	100·	99·	99·7	98·7	99·2	98·5	..	98·4	98·5	98·3	98·5	98·2	98·5	98·2	98·6	98·2	98·3

The Morning Observations were taken between 8 and 9 o'clock A.M., and the Evening between 6 and 6 o'clock P.M. The Thermometer being left in the Axilla for five minutes.

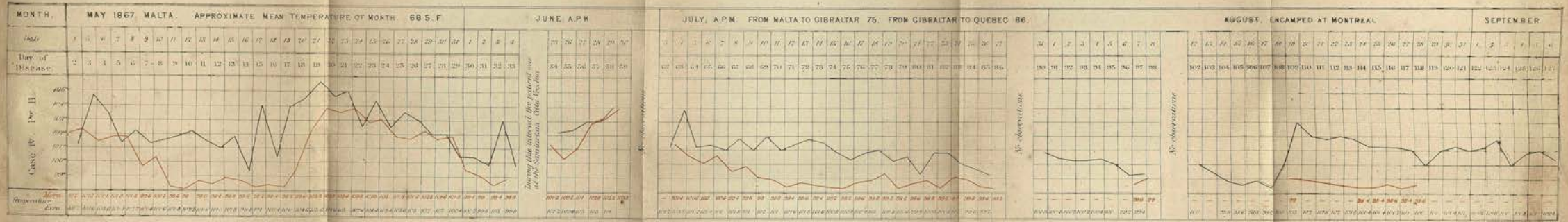
* I. D., Imperial Drink of Bitartrate of Potash.

Hamilton, Canada West, November, 1867.

J. P. H. BOILEAU, M.B., *Assistant-Surgeon, 29th Regiment.*

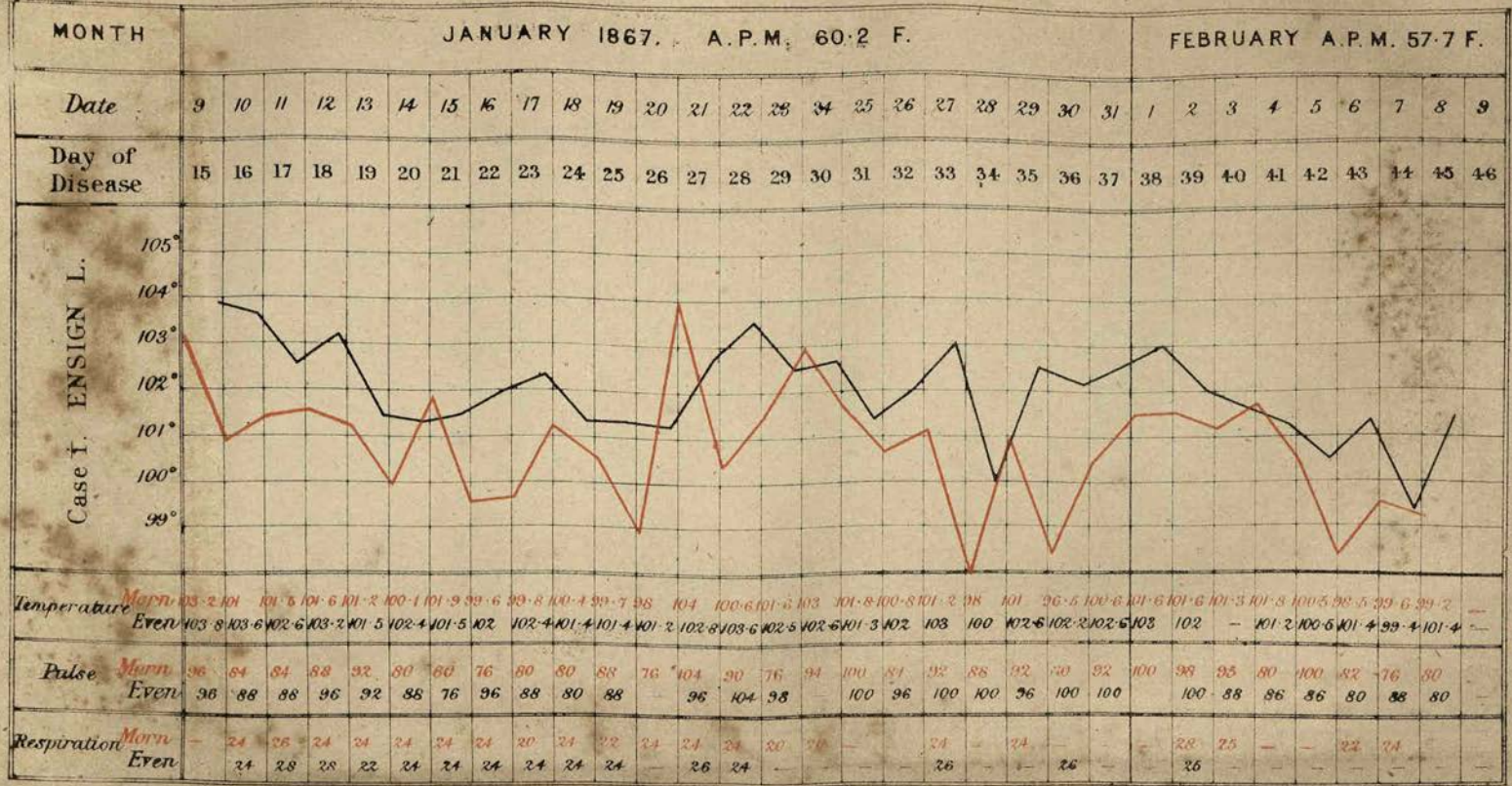
GRAPHIC REPRESENTATION OF MEDITERRANEAN REMITTENT AND OTHER ALLIED FEVERS. OFFICERS & MEN.

The black lines connect the evening temperature, the red lines connect the morning


MONTH.
MAY 1867. MALTA. APPROXIMATE MEAN TEMPERATURE OF MONTH. 68·5 F.
JUNE. A.P.M.
JULY. A.P.M. FROM MALTA TO GIBRALTAR 75. FROM GIBRALTAR TO QUEBEC 66.
AUGUST. ENCAMPED AT MONTREAL.
SEPTEMBER
Date
Day of Disease
Case & Per II
Mean Temperature
Even
No observations
Journey that altered the patient was the Sanitarium Otho Section

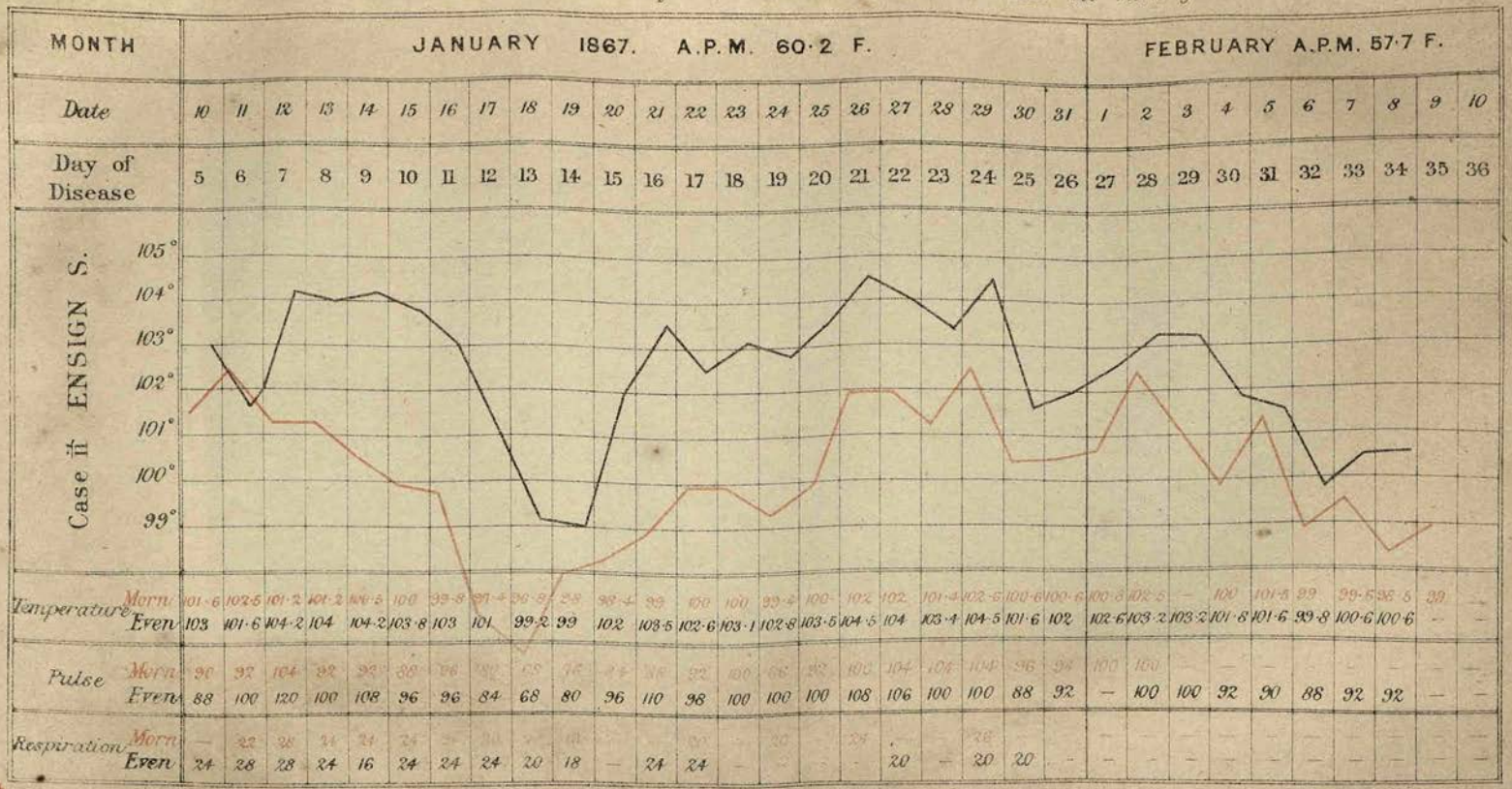
CRAPHIC REPRESENTATION OF MEDITERRANEAN REMITTENT AND OTHER ALLIED FEVERS. OFFICERS & MEN

The black lines connect the evening temperatures, the red lines connect the morning



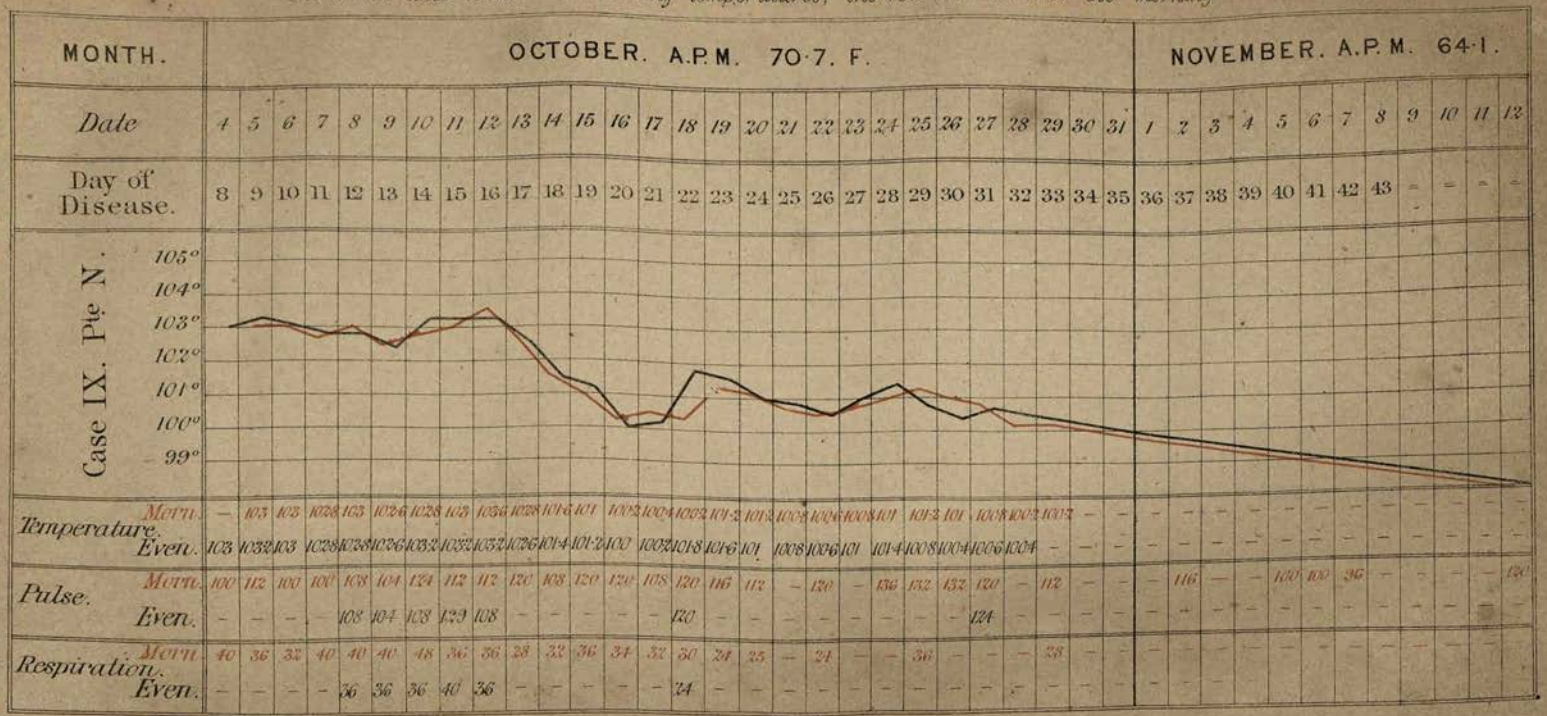
GRAPHIC REPRESENTATION OF MEDITERRANEAN REMITTENT AND OTHER ALLIED FEVERS. OFFICERS & MEN.

The black lines connect the evening temperatures, the red lines connect the morning.



GRAPHIC REPRESENTATION OF MEDITERRANEAN REMITTENT AND OTHER ALLIED FEVERS. OFFICERS & MEN.

The black lines connect the evening temperatures, the red lines connect the morning



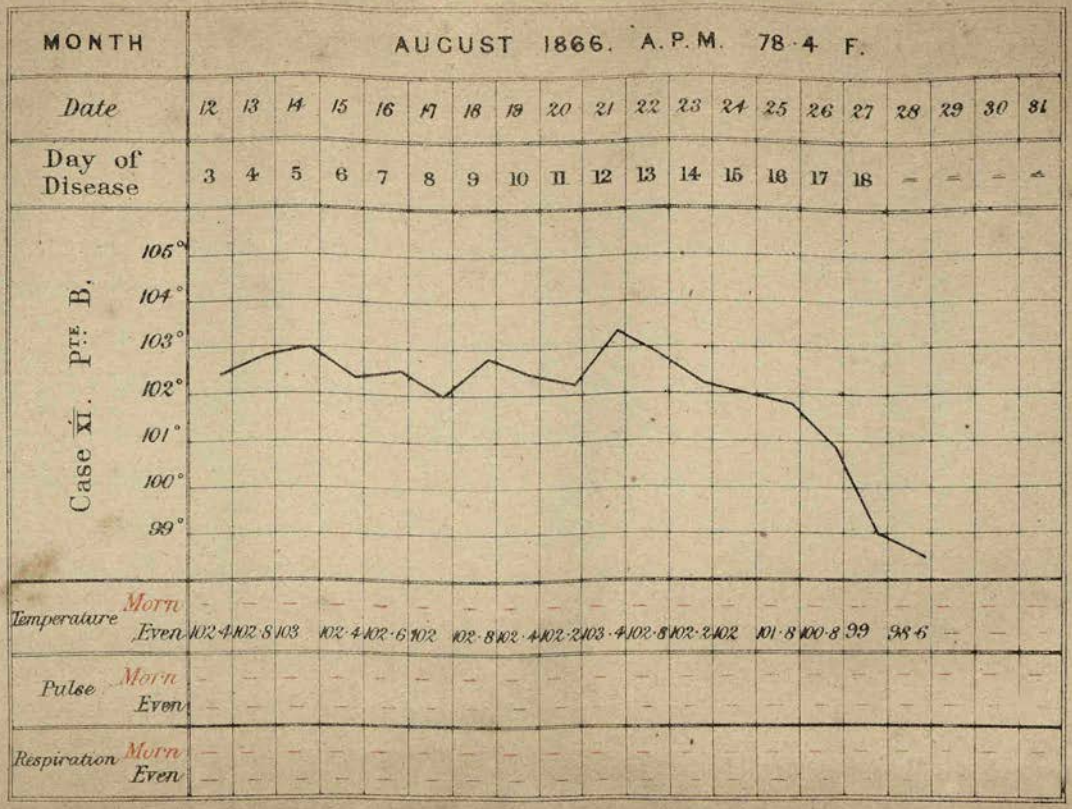
GRAPHIC REPRESENTATION OF MEDITERRANEAN REMITTENT AND OTHER ALLIED FEVERS. OFFICERS & MEN.

The black lines connect the evening temperatures, the red lines connect the morning

MONTH.	SEPTR 1866. A.P.M. 76·4. F.											OCTOBER A.P.M. 70·7																										
Date.	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Day of Disease.	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	–	–	–	–	–	–	–	–	–	–
Case X. Pte C.	*105°* *104°* *103°* *102°* *101°* *100°* *99°*																																							
Temperature Morn.	101·6	102·4	104·2	103	103·6	104·2	104·6	102·4	104·2	103·8	103·8	103·6	104·2	102·4	102·4	104·2	102·2	102	102	102	102	101·4	101·2	100·4	100·4	100	99·6	–	98·6	98·4	98·4	99·4	98·8	98·4	98·4	98·8	98·2	–	–	–
Even.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Pulse Morn.	–	–	88	100	96	–	100	100	92	100	–	96	100	–	–	–	–	–	112	112	120	104	120	–	–	–	–	–	100	–	–	–	–	–	–	–	–	–	–	–
Even.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Respiration Morn.	–	–	32	36	36	–	–	36	36	40	–	48	48	–	–	–	–	–	48	47	–	–	–	–	–	–	–	–	32	–	–	–	–	–	–	–	–	–	–	–
Even.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

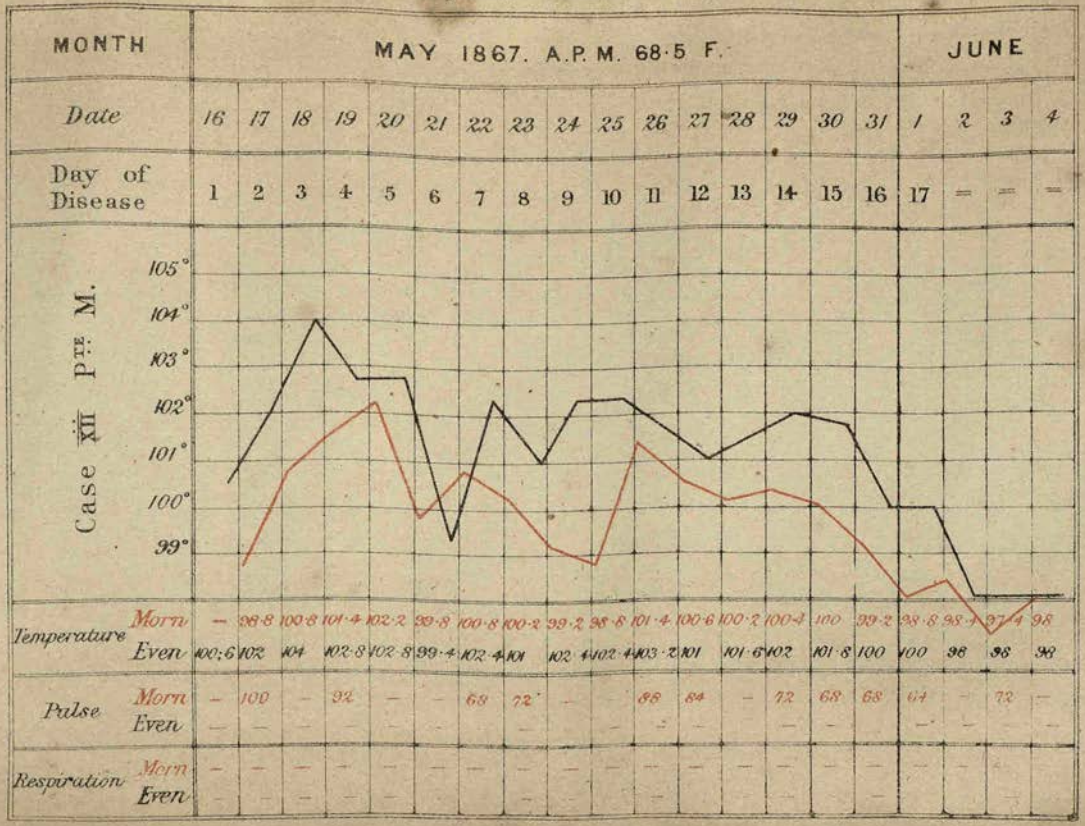
GRAPHIC REPRESENTATION OF MEDITERRANEAN REMITTENT AND OTHER ALLIED FEVERS, OFFICERS & MEN.

The black lines connect the evening temperatures, the red lines connect the morning



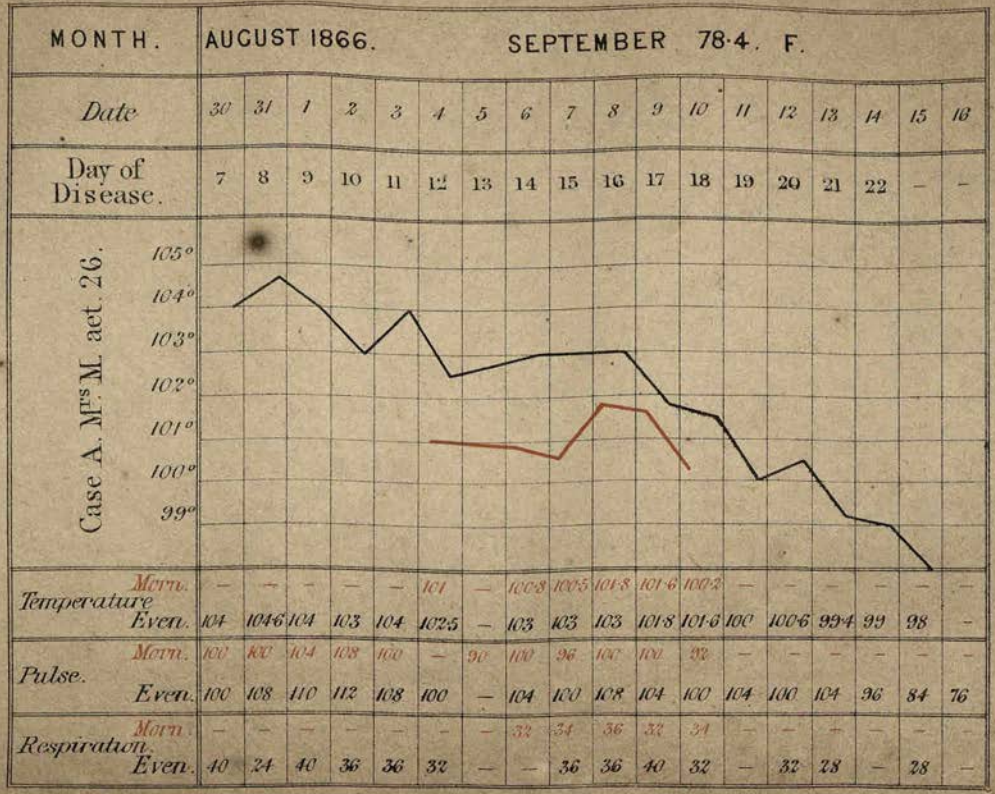
GRAPHIC REPRESENTATION OF MEDITERRANEAN REMITTENT AND OTHER ALLIED FEVERS. OFFICERS & MEN.

The black lines connect the evening temperatures, the red lines connect the morning.



GRAPHIC REPRESENTATION OF MEDITERRANEAN REMITTENT AND OTHER ALLIED FEVERS. WOMEN & CHILDREN.

The black lines connect the evening temperatures, the red lines connect the morning.



GRAPHIC REPRESENTATION OF MEDITERRANEAN REMITTENT AND OTHER ALLIED FEVERS. WOMEN & CHILDREN.

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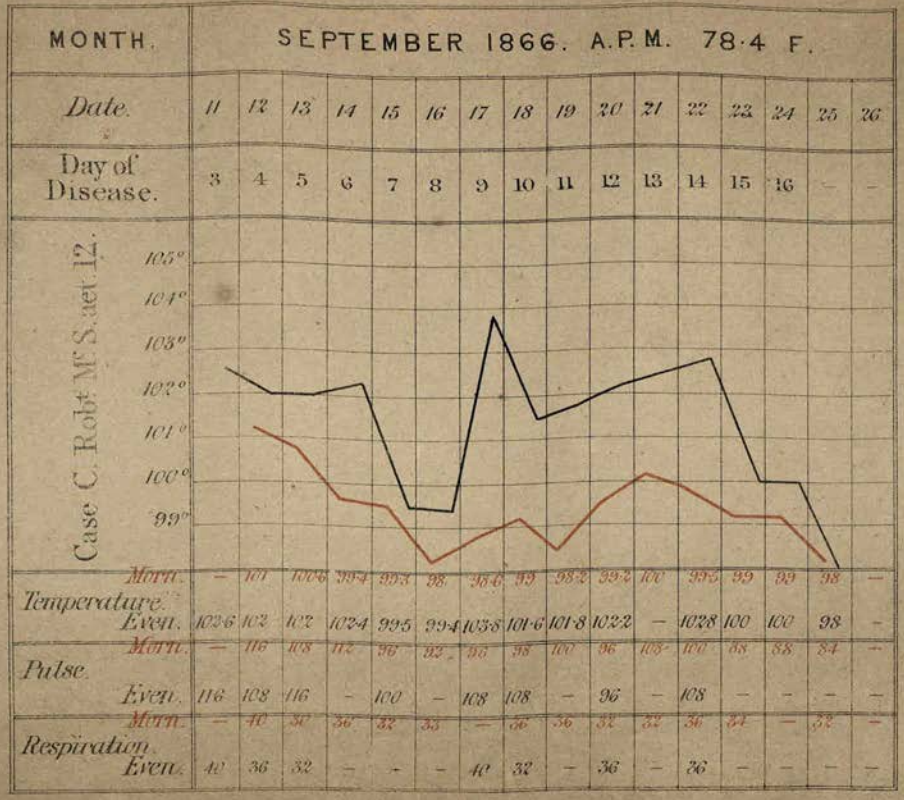

GRAPHIC REPRESENTATION OF MEDITERRANEAN REMITTENT AND OTHER ALLIED FEVERS. WOMEN & CHILDREN.

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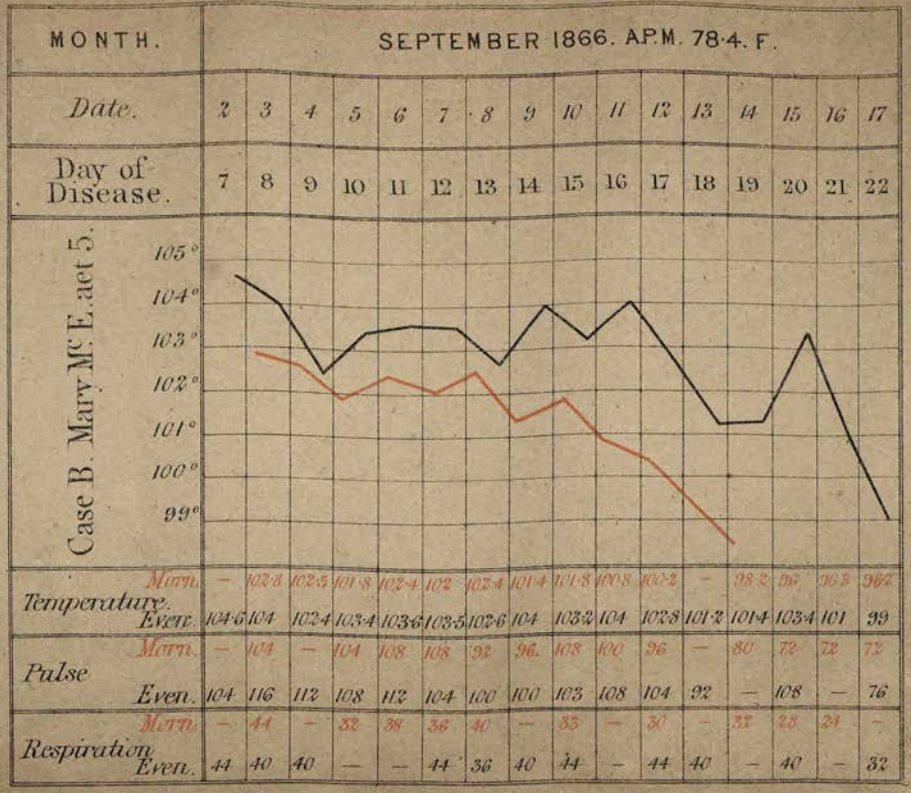
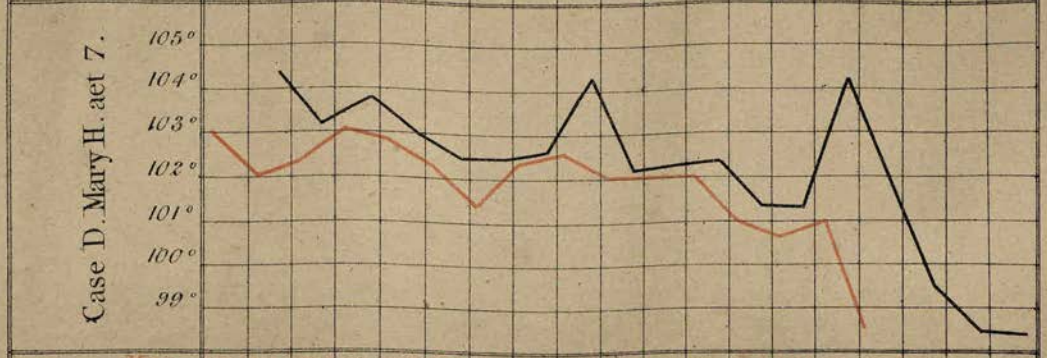


GRAPHIC REPRESENTATION OF MEDITERRANEAN REMITTENT AND OTHER ALLIED FEVERS. WOMEN & CHILDREN.

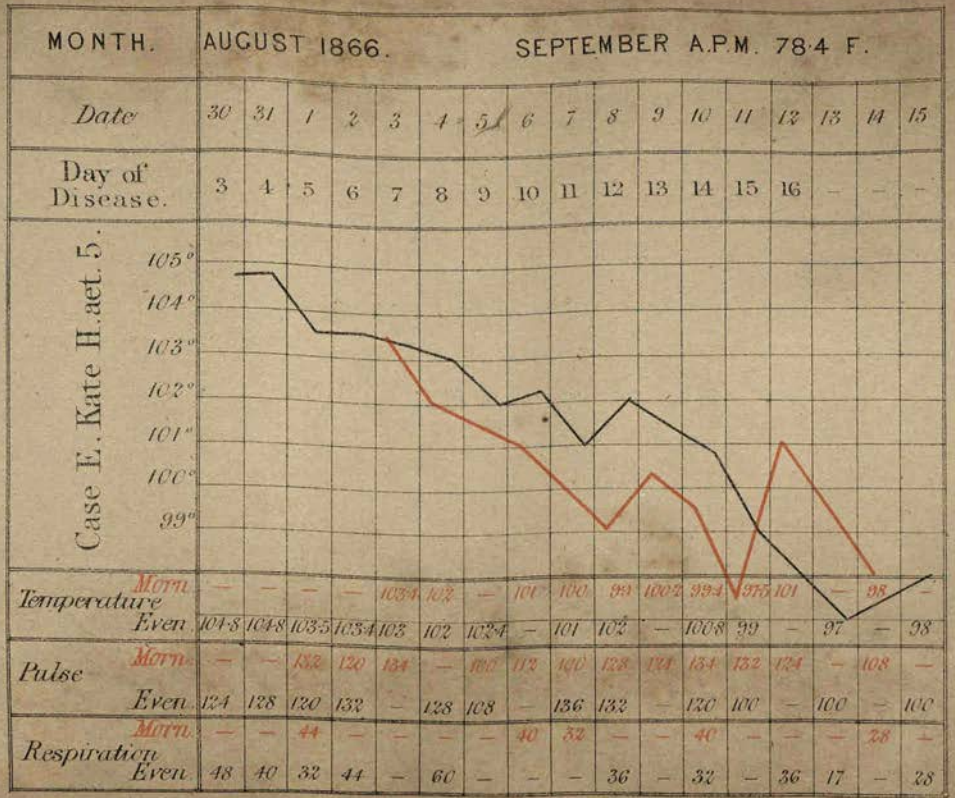
The black lines connect the evening temperatures, the red lines connect the morning.

MONTH.	SEPTEMBER 1866. A.P.M. 78·4. F																		
Date.	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Day of Disease.	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Temperature Morn.	103	102	102·4	103	103·8	102·2	101·4	102·4	102·6	102	102	102	101	100·6	101	98·5	96	—	—
Temperature Even.	—	104·4	103·2	103·8	103	102·6	102·6	102·6	104·2	102	—	102·4	101·4	101·4	104·2	—	99·5	98·6	98·4
Pulse Morn.	100	120	120	104	120	108	116	120	124	120	128	132	112	108	116	112	100	—	—
Pulse Even.	—	112	120	120	120	116	128	120	—	120	—	132	124	—	132	—	108	—	—
Respiration Morn.	—	36	36	—	42	36	36	—	36	40	40	—	—	36	40	44	40	—	—
Respiration Even.	—	44	32	38	48	—	—	40	—	44	36	—	48	—	28	—	28	—	—



GRAPHIC REPRESENTATION OF MEDITERRANEAN REMITTENT AND OTHER ALLIED FEVERS. WOMEN & CHILDREN.

The black lines connect the evening temperatures, the red lines connect the morning



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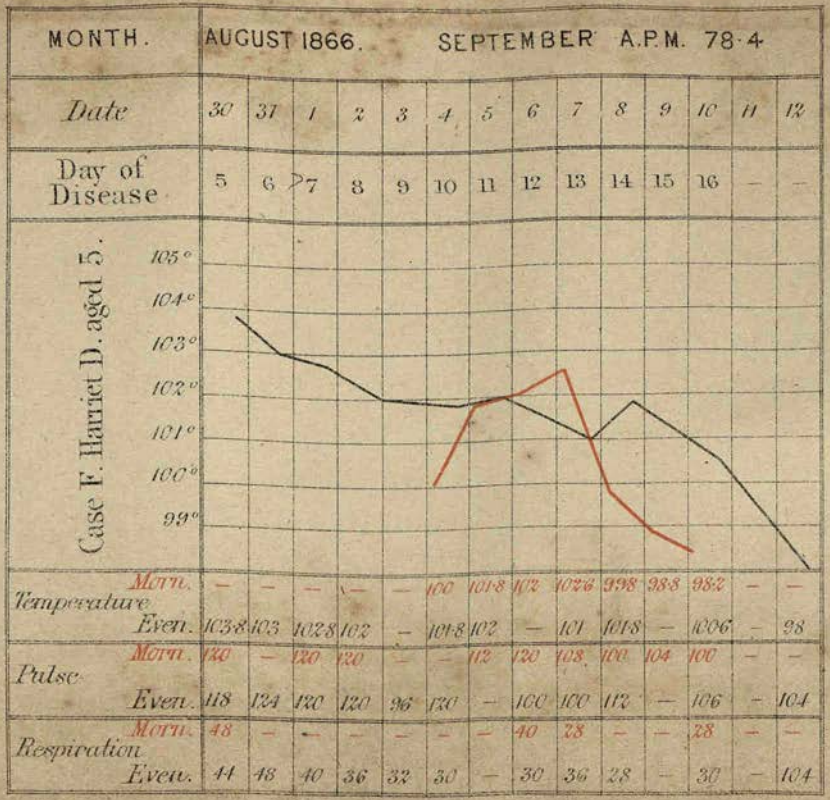


GRAPHIC REPRESENTATION OF THE MORNING AND EVENING TEMPERATURES, OBSERVED IN FIFTY-FOUR CASES OF "MALTESE FEVER."

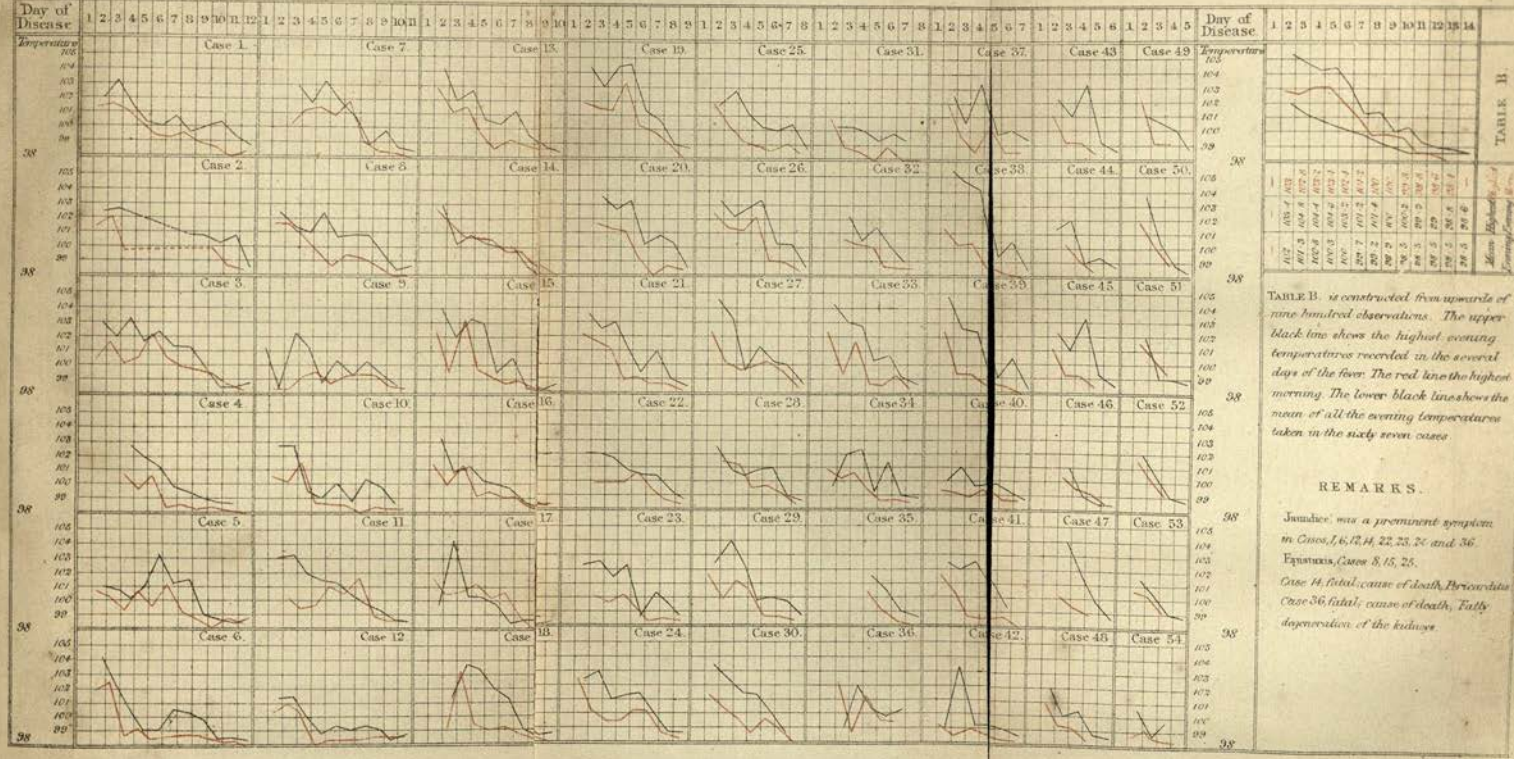


TABLE B.

TABLE B. *is constructed from upwards of nine hundred observations. The upper black line shews the highest evening temperatures recorded in the several days of the fever. The red line the highest morning. The lower black line shews the mean of all the evening temperatures taken in the sixty seven cases.*

REMARKS.

Jaundice, was a prominent symptom in Cases, 1, 6, 12, 14, 22, 23, 24 and 36.

Epistaxis, Cases 8, 15, 25.

Case 14, fatal; cause of death, Pericarditis.

Case 36, fatal; cause of death, Fatty degeneration of the kidneys.

APPENDIX No. XLVIII.

A FEW REMARKS AS TO THE FEVER MET WITH ON THE MOUNT ABOO SANITARIUM.

By Staff Assistant-Surgeon VEALE.

Out of 100 attacks of fever occurring in 63 persons, there were-

Single Paroxysms	39
Quotidians	22
Tertians	13
Continued	8
Double quotidians	6
Quartans	2
Double tertians	1
Of indefinite type	9
Total	100

Period of Attack.—Although in a few instances the cold stage of an ague may set in without any premonitory symptoms, it is more commonly preceded by feelings of lassitude, and other symptoms referable chiefly to the nervous system. It is therefore incorrect to say that the fever only begins when decided rigors occur. In many cases there is no perceptible cold stage, and the patient *gradually* passes into a state of intense pyrexia. In 26 out of the 100 attacks in question, for example, the hour of invasion could not be determined, partly from this circumstance and partly from other causes. In the remaining 74 the setting in of the cold stage was ascertained, and was as follows:—

	A.M.											
Hour of attack	Night. 12	1	2	3	3	5	6	7	8	9	10	11
Number of cases	1	1	3	1	1	2	9	2	2	4	5	8

	P.M.											
Hour of attack	Noon.	1	2	3	4	5	6	7	8	9	10	11
Number of cases	7	4	7	4	4	..	2	1	2	2	1	1

The predominance of the attacks at 6 in the morning was probably not so much due to the hour *per se* as to the fact that the men usually had to turn out for the morning parade at that time. Had they been able to remain in bed the initial rigor might have been postponed. There was no such cause in operation, however, to account for the frequency with which the attacks began in the hours from 9 A.M. to 4 P.M. From 11 A.M. to 1 P.M.—that is to say, about mid-day—the fever most commonly manifested itself unmistakeably by the invasion of the cold stage.

Temperature of the Body during the Attack.—The highest temperature indicated by the thermometer was 105·8°, but it did not appear to me that the

danger to the constitution bore any definite relation to the amount of heat developed in the hot stage; and on the whole I think there may be some truth in the notion that a "good" hot stage, as the Americans have termed it, is desirable.

Nervous System.—The initial sign is a condition which, if carried to excess, would end in convulsions of an epiliptiform kind, and this I have seen to occur in children. On some occasions I have observed in strong healthy young men symptoms of hysteria to occur at the commencement of an attack, whilst in others I have observed "fits," attended with more or less insensibility and semi-coma.

Pain is present nearly always, and the following is an analysis of the frequency of its occurrence in the different regions of the head and trunk. In 100 attacks, pain was felt in the—

	Times.
Whole frontal region	77
„ occipital „	14
Left frontal only „	7
Right „ „	2
Head—total	90
In the—	
Right hypochondriac region only	17
Left „ „	10
Both hypochondria	5
Epigastric region	5
Abdomen—total	87
Lumbar region	18

It is of course to be understood that in many cases pain occurred in several regions at once, but this statement brings clearly into view the predominance of headache in this fever.

Digestive System.—The proportion in which functional disorder of this system occurs is approximately shown by the statement that in the 100 cases there were vomiting 45 times, and increased alvine discharges 35 times.

I have not been able to perceive anything at all peculiar in the state of the tongue in malarial fever, except the rapidity with which it becomes thickly coated, brown, and parched, at least in this country.

Circulatory System.—There is nothing to record under this heading. The pulse is not to be depended on.

Respiratory System.—The respirations are always increased in frequency at the commencement of an attack; and if it were not for the difficulty of observing them accurately, I am of opinion that they would be found more trustworthy as a symptom than the pulse.

Cutaneous System.—Jaundice, to a slight extent, occurred in 5 of the 100 attacks; but it is important to note that only two individuals presented this symptom. By jaundice I mean, on the present occasion, merely a yellow colouration of the skin from the presence of bile. In one or two instances I observed, with each attack of fever, a peculier eruption resembling urticaria.

Urinary System.—Some writers have commented upon an extreme irritability of the bladder in malarial fever in India, and have stated that the urine during the paroxysm is of low specific gravity, and paler than usual in colour. The former symptom was not noticed in any of the cases under consideration.

(*a*) *Natural Colour of the Urine during the Fit.*—In 22 cases the urine at this period was—

	Times.
Above the average in colour	5
Below „ „	5
Natural	12

In 79 out of the 100 cases, the colour of the urine first passed in the morning, without reference to any pyrexial or apyrexial period, was found to be—

		per cent.
Above the average in	30 cases	= 38
Below "	24 cases	= 30.
Natural	25 cases	= 31.

It thus appears that there was a slight excess of cases in which the colour of the urine was heightened.

(*b*) *Reaction.*—In 86 cases it was—

		per cent.
Alkaline in	2	= 2·32
Neutral in	8	= 9·30
Acid in	76	= 88·37

(*c*) *Albumen.*—This was found in the urine in 18 out of 87 cases, or in 20·68 per cent., which I believe is somewhat above the average noted by other observers.

(*d*) *Specific Gravity.*—Hitherto I have not had leisure to reduce to order my notes on this subject. So far as I can judge at present, however, I believe that the specific gravity is in reality increased, both during the fit and for some time after it, and that after two or sometimes even three days it becomes decreased. In some instances this may occur at an earlier period, *i. e.* within 24 hours from the commencement of the sweating stage.

(*e*) *Pigment.*—In 42 cases I examined the pigment with nitric acid alone, without the aid of heat, by allowing a small quantity of urine to trickle slowly down a test-tube containing about 30 minims of nitric acid. In 24 of these, or 57 per cent., the colour of the uppermost ring was either blue or a very decided purple. It may therefore be concluded that in rather more than one-half of the cases there was an abnormal quantity of uroglaucine in the urine.

(*f*) *Bile.*—A green colour was struck in 3 out of 83 cases, equal to 3·61 per cent.

(*g*) *Urates.*—In 28 cases I noted the presence or absence of urates in the urine used for the detection of the two preceding substances; and in 23 of these, which is equal to 82 per cent., I found an excess of urates.

(*h*) *Sugar.*—I tested for this substance in 76 cases, adopting the method recommended by M. Becquerel before using the copper solution. In 8 only was there a *distinct precipitate* of suboxide. This number gives a proportion of a little more than 10 per cent., but in 18 other cases there were traces of sugar, so that, taking the two numbers together, it would appear that sugar may be detected in the urine in about a fourth of the cases of fever at Aboo. This conclusion, of course, rests on the assumption that the copper solution is a reliable test for sugar, and that no other substances in the urine can affect the reduction of the salt.

(*i*) *Chlorides.*—There was a deficiency of chlorides in a considerable number of cases. Sometimes the chlorides were altogether wanting; at others they were deficient in amount. Only in 15 cases the chlorides were either wanting or lessened in 10, or in the proportion of 66·6 per cent.

None of these cases proved immediately fatal. One man, named Clark, died, however, after repeated attacks both in Aboo and Deesa. Albuminuria in his case was very marked from the first, and his death took place after my departure. I believe his kidneys had undergone the amyloid degeneration.

Treatment.—I give the preference to large rather than to small doses of quinine in the treatment of this fever, because, as must be apparent from the preceding statements, the disease menaces the integrity of the constitution, even if it does not at once destroy life. It is therefore of the highest importance to prevent relapses, and I found small doses to be of but little efficacy in this respect.

APPENDIX No. XLIX.

CASES OF FEVER, WITH REMARKS ON THE TOPOGRAPHY, CLIMATE, AND SANITARY CONDITION OF NEWERA ELLIA DURING THE YEAR 1865.

By Staff Assistant-Surgeon HUGH D. MASSY, B.A.

NEWERA ELLIA is a table-land elevated to a height of about 6,200 feet above sea-level, amidst the mountains of the central province of Ceylon, encircled by a still higher range, which, rising most on the northern side, includes the highest peak in the island, Point Pedro, attaining an elevation of 8,280 feet.

Except that it has served as a retreat for a Kandyan king about the year 1610, there is no evidence of its having been occupied by natives. It was first visited by Europeans in 1826, and it was not a European station till 1828.

Those facts are of importance, as they serve to explain an apparent discrepancy between former observers and the experience of the writer; as some time usually elapses, especially at a healthy station, before the want of sanitary precautions impresses its character upon disease: for example, Professor Parkes, in summing up in 1864 the former sanitary experience of the station, notices the absence of "hill diarrhœa;" but in the following year diarrhœa and dysentry *became* very prevalent.

The plateau comprises the Upper, Lower, and Moon Plains. The latter is almost uninhabited, swampy, and quite enclosed by hills. The centre of the Upper Plain is little better than a swamp, traversed by an exceedingly tortuous stream, and surrounded by higher ground, on which stand the scattered dwellings of the civil residents and visitors. To the west of this is the native bazaar. The so-called "Barrack Plain" is an undulating valley, bounded on the north by precipitous cliffs and dense forest, and on the south by hills which are either wooded or covered with coarse sedge. Those hills form the boundary between the Barrack and Upper Plains, and one of the most westerly has been proposed as the site for new barracks. It is more open and airy; would be far more cheerful, and possesses much greater natural facilities for drainage than the present site. Its disadvantages are want of water (which should be brought from some distance by pipes), a decidedly marshy character (common more or less to all sites at the station). Greater exposure to the force of the south-west monsoon, which, however, is partly broken by the opposite hills, and it would require extensive clearing and deep drainage.

The Barrack Plain is only inhabited by a small detachment of European troops, comprising a working party, employed by the Royal Engineers, and convalescents from the low country, and a few natives.

The surface soil of the present site is of a light, fibrous, peaty nature, averaging on a rough estimate about 18 inches in depth. Underneath is a constant thin stratum of gravel, scarcely averaging 3 inches in thickness.

All beneath the gravel, as far as can be observed, consists of decomposed gneiss, traversed by a vein of plumbago, and interspersed with granite rocks, some of which project above the ground.

The water supply consists of clear pebbly streams, one of which is fed by a waterfall upwards of 150 feet in height.

The neighbouring forest contains a variety of timber trees, many very valuable for building purposes. It is chiefly remarkable for dense underwood consisting mostly of the "nilloo," described by Sir J. E. Tennent, and by Sir S. Baker. It is exceedingly difficult to penetrate, partly from the closeness of the growing underwood, but still more from the ground having become strewn, often to a depth of several feet, with the decaying stems of the nilloo.

The atmosphere is stagnant, damp, and oppressive, and is evidently to some extent malarious; for cutting timber is the most trying occupation to the men employed on the works, the strongest alone can stand it, even they suffer occasionally, and always from *periodic fever*.

The vegetation of the open country chiefly represents the sterile order of Cyperaceæ, imparting to the landscape its sombre tints of grey and brown, broken by a few rhododendrons and ferns, and by tall reeds of a vivid green, which, contrasting with the brown sedge, mark the tortuous windings of the streams, the banks of which in the more open situations are fringed with a variety of small flowering plants, possessing a mixed aquatic and mountain character.

Attempts to cultivate useful grasses have been partially successful. But much greater success has attended the cultivation of English vegetables, especially potatoes; and advantage might be taken of this station for growing them in soldiers' gardens in sufficient quantity to supply the troops in the low country, where vegetables are so very scarce that the ration has been reported as wanting this necessary item. It would also provide employment suitable to the station, conducive to health, and calculated to lessen the monotony of which the men so often complain, and which has such a tendency to maintain habits of intemperance.

The meteorology of Newera Ellia has received attention from former observers, a summary of whose contributions will be found in Professor Parkes's "Manual of Hygiene," and in Sir J. E. Tennent's work on Ceylon. A barometer was not kept at the station during the early part of the year. The mercury stands at about 24·25 inches; the diurnal oscillation is very marked, but the range is small. The approximate mean temperature for the year was 60·2; the mean monthly range, 28·1; the mean daily range, 15·1; mean deduced dew-point, 54·7; humidity, 83·2 per cent. for the year. These figures must be received with a certain limitation, as, although the grass and sun thermometers were well placed, the others were unavoidably kept in the hospital verandah, which, though the latter was very shallow and lofty, was found to occasion some discrepancy. The number of days on which rain fell was 227, the amount collected was 86·246 inches. The chief peculiarities of the climate are the rarefied atmosphere and great range of temperature, which are especially exemplified by an exceedingly high maximum in sun, coinciding, within the same period of 24 hours, with a remarkably low minimum on grass. The former is attributable to latitude, elevation, and increased radiation of heat from the ground, and absence of cloud in the dry season; and the latter to the occurrence of hoarfrost in the early morning. Thus, during the north-east monsoon, the black-bulb radiation thermometer commonly registered 130° F., or even a few degrees higher, at the same time that the grass minimum recorded a temperature some degrees below the freezing-point.

There is far less fog at the station than would be encountered at elevations of from 1,000 to 2,000 feet nearer the sea-level.

The most agreeable season is from January to May, as the mild and dry north-east monsoon then prevails, though in the shade the light breeze is often keen and chill. The south-west monsoon, prevailing during the rest of the year, and accompanied by storm and rain (sometimes driven horizontally), strongly contrasts with the preceding season.

The most unhealthy seasons are the periods of change in the monsoons. The atmosphere becomes oppressive, occasions a feeling of malaise even in healthy persons, greatly increases the liability to relapses of periodic fever, affects unfavourably the progress of organic disease through the increased tendency to pyrexia and is most unfavourable to chronic dysentery as the humidity then most frequently reaches saturation.

A catarrhal epidemic, resembling influenza, accompanied the setting in of the north-east monsoon at the close of the year. It affected alike Europeans and natives, originated in damp sites, and eventually spread to all the scattered dwellings comprising the station. At first it affected the bronchial membrane, and subsequently the gastro-intestinal. The fever was periodic, remittent or intermittent. It was generally mild, affected children more severely than adults, and even severe cases derived speedy relief from quinine, combined usually with ipecacuanha and hyoscyamus.

Perhaps the sanitary condition of the station may best be illustrated by a few comments on brief abstracts of the most important cases of zymotic disease treated during the period here referred to.

Attention has of late been directed to the study of *hybrid* disease, an example of which will be found in Professor Aitken's work on medicine.

A mixed type of fever prevailed at Newera Ellia, which seemed to illustrate this important subject by the evident co-existence of two distinct poisons in the system. The poisons referred to are those of typhoid and of periodic fever. The etiology and type of the hybrid disease may be most clearly indicated by the following abstracts:—

Case 1.—Mrs. H., aged 31, wife of Serjeant H., 2nd Battalion 25th Regiment, on the 20th of January complained of having for some time noticed a bad smell in their quarters, and of gradually increasing indisposition and loss of appetite. Her symptoms consisted of brown speckled tongue, scanty urine, parched skin, and distinct exacerbations of fever each evening at about 6 P.M.

On the 22nd she was too ill to leave her bed. Aspect typhoid, voice low, thirst excessive, abdomen tender, skin alternately parched and sweating.

Treatment.—Quinine in solution, with nitric ether; beef-tea. She could take from 15 to 20 grains of quinine in the day without cinchonism.

On the 23rd there was some vomiting and retching; urine increased in quantity; cinchonism occurred after she had taken 45 grains of quinine, which was then omitted.

Treatment.—Solution of acetate of ammonia, nitric ether, and hyoscyamus; beef-tea and wine.

On the 24th, marked typhoid condition; low, fretful delirium; and typh odour. In consequence of the only window in the house having had the swivel of the sash broken, it had been nailed up. Complete removal of the window-sash was attended with such marked advantage that the patient was found free from delirium at the next visit, and had no bad symptom afterwards, though her convalescence was tedious.

There was an old unguarded cesspit latrine under the roof of the quarter, which had been emptied out a short time before her attack. During her illness it was covered up with dry earth, subsequently cleaned out and closed, and a new latrine was constructed on the dry plan, at a suitable distance from the dwelling.

Case 2.—Lance Corporal K., 2nd Battalion 25th Regiment, aged 25, employed on the works; intemperate; healthy before his arrival at the station; never had fever previously.

On 30th July, after getting wet through in the jungle, he got drunk, and went to sleep in the barrack-room in his wet clothes.

On 1st August, he complained of frontal headache, and presented a typhoid aspect and brown tongue, in addition to symptoms of remittent fever, the periodic type predominating. Subsequently the evacuations from the bowels became frequent, fluid, and of yellow-ochre colour.

On the morning of the 12th he changed for the worse; sunk down in bed; features became pinched; dark circles surrounded the eyes; tongue red and glazed; ulcerated at the edge ("Ceylon tongue"); thirst extreme; complete anorexia; rose spots appeared on the abdomen, which became intolerant of pressure.

Treatment.—On admission, an emetic of carbonate of ammonia and ipecacuanha; subsequently quinine and hydrochloric acid; essence of beef and brandy.

On the 13th, respiration was rendered shallow and thoracic by tympanitic distension of the abdomen.

On the 14th, hiccup was relieved by ether.

On the 15th, there was evidence of general improvement.

On the 16th, vomiting was relieved by spirit of chloroform.

On the 17th, the urine became albuminous, and the sub-cutaneous areolar tissue of the abdomen œdematous. Dry cupped over the kidneys.

On the 18th, the tongue was extensively ulcerated. Fresh rose spots appeared on the abdomen and thorax.

On the 19th, spasmodic cough was relieved by ether.

On the 20th, the liver evidently increased in size; periodic sweating was observed.

On the 21st, sordes collected upon the teeth. The hydrochloric acid and quinine were continued, and seemed to agree with him.

On the 22nd, the first sound of the heart was weaker than the second; body covered with sudamina.

On the 24th, prostration became extreme. Four drops of cajuput oil were added to each acid quinine draught; essence of beef and brandy every half-hour.

On the 25th, quinine was omitted, but the acid was continued.

On the 26th, he was progressing favourably.

On the 4th of September, excessive purging was checked by a draught containing opium and catechu. He remained under treatment till October; passed much altered blood by stool; became anæmic, but derived much benefit from iron, and ultimately made a good recovery.

Case 3.—Hospital Serjeant B., 2nd Battalion 25th Regiment, aged 28. Intemperate. Subject to intermittent fever of quotidian type. Had been transferred for duty to Newera Ellia, for the benefit of his health. The room in which he slept was close to the hospital latrine. His wife had observed a bad smell in the room. On the same night they were both seized with a sense of extreme prostration and purging. His wife soon recovered under treatment, but he became progressively worse. His symptoms dated from 21st August; consisted of extreme lassitude—anorexia and fever which, though continued, had superadded to it a distinct paroxysm, comprising a cold, hot, and sweating stage, recurring each evening at the same hour.

Treatment.—Quinine and hydrochloric acid; essence of beef and brandy.

On 6th September, low muttering delirium alternated with restlessness; loathing of food, vomiting, hiccup, and scanty urine.

Dry cupped over the kidneys; enemata of essence of beef and brandy.

On the 7th, ammonia and spirit of chloroform were substituted for the acid quinine mixture. Vomiting was relieved by a mustard poultice to the epigastrium.

On the 8th, the pulse was thready, and tended to intermit.

On the 9th, he expressed great despondency.

On the 10th, the eyes appeared sunken, and were surrounded by dark circles; tenderness in both iliac regions.

On the 12th, rose spots appeared on the abdomen; typh odour; liver tender.

On the 14th, the circulation manifested excitement without power; nights restless; tongue brown and tremulous.

On the 16th, reduplication of the first sound, alternated with systolic murmur at apex.

On the 17th, excessive purging was checked by an astringent draught.

On the 21st, reduplication of the first sound, but no murmur.

On the 22nd, great tremor, agitation, numbness in the abdomen and lower extremities.

On the 23rd, first sound absent; second sound clear and distinct; pulse, 72, thready.

On the 26th, the mitral murmur returned. It seemed due, not to organic disease or anæmia, but rather to some mal-adjustment of the lappets of the mitral valve; perhaps from temporary paralysis of the papillary muscles, as suggested by Skoda.

During convalescence a glazed state of tongue was observed to alternate with diarrhœa. He experienced slight loss of power and numbness in both lower extremities, and remained under treatment until 20th October, when he was transferred to Colombo with a view to his being invalided to England.

Case 4.—Private M., 2nd Battalion, 25th Regiment, aged 20. Employed on the works. Intemperate. Of strumous diathesis.

On 15th September he contracted acute laryngitis from exposure to wet. He was admitted on the 17th for that disease, from which he recovered so far as to be allowed up. But on the 26th he complained of extreme weakness and loss of appetite.

On the 27th fever of remittent type set in.

On the 28th the mouth was parched, lips black, tongue mottled with white, red, and brown; thirst excessive. The same treatment was employed as in the former cases.

On the 29th he was removed to the ward furthest from the latrine.

On 30th inst. a bad smell was observed in the ward from which he had been removed, although it looked very clean and well ventilated; had been mopped with solution of chloride of zinc, and had a plate containing chloride of lime on the floor. Three of the flooring boards were raised, the joists were found rotten, and most offensive, from having become soaked with sewage which the rainfall had washed down the slope from the unguarded cesspit of the adjacent latrine. No ventilation had been provided under the floors. There was no drainage.

On this date debility increased, purging set in, evacuations of yellow-ochre colour.

On 1st October the tongue was cracked, brown in the centre, spotted at the edges; lips, teeth, and lining of mouth covered with sordes. Severe paroxysms of laryngeal cough terminated in expectoration; voice became hoarse. He was cinchonized. Quinine omitted.

Treatment.—Hydrochloric acid and ether. Essence of beef and brandy.

On the 2nd, aspect more typhoid, occasional vomiting, streaks of blood in the expectoration. Pulse 120.

At 2 P.M. low muttering delirium.

On the 3rd, pulse 132, tongue bleeding; abdomen tender, tympanitic, presented a few rose spots. Paroxysms of laryngeal cough terminated in bloody expectoration. Much relief from the application of pure glycerine to the tongue, which was raw and dry. Temporary relief from a succession of mustard poultices over the larynx.

On the 4th he had no sleep owing to paroxysms of laryngeal cough. Urine scanty, slightly albuminous; tongue relieved by application of glycerine.

On the 5th, the previous night had been passed in delirious mutterings and restless efforts to get out of bed. Epistaxis. Pulse 120, respiration 24. Bed sores threatened over every part exposed to the slightest pressure. He expressed relief from the acid. Dry cupped over the kidneys. Essence of beef and brandy by the mouth and rectum. Urine drawn off by the catheter.

In the evening he had passed much altered blood by stool; was becoming comatose.

On the 6th he passed a large quantity of coagulated blood by stool. Pulse 132, respiration 24. Complete aphonia. Tongue coated with dried blood; urine contained more albumen. He preferred the acid draught to anything else.

On the 7th pulse 125, respiration 40. Urine scanty, sp. gr. 1014, acid, of dark red colour, with copious red sediment, highly albuminous, effervesced with nitric acid, notwithstanding its acid reaction to test paper. Microscopic examination detected blood corpuseles, and minute crystals of uric acid.

Towards evening there was a slight effort to rally; but on the 8th he changed for the worse; countenance became hyppocratic; extremities cold. Still he lingered until 8 P.M., when he died suddenly by syncope.

Dissection of the Body eleven hours after Death :—

Rigor mortis marked; livor of depending parts; slight general œdema.

Cranium.—The cerebral arachnoid presented some old granular lymph over both hemispheres along the course of the superior longitudinal sinus. The anterior cerebral lobes were firmly united by old adhesions at the site of the longitudinal fissure. Some general opacity of the arachnoid. The larger cerebral and spinal vessels were comparatively empty, but the smaller ones were minutely injected. There was much sub-arachnoid fluid besides serous effusion into the ventricles. Each choroid plexus contained a symmetrically-placed, yellow, cheesy deposit, about the size of a pea.

Thorax. The interior of the larynx was gangrenous, the left true chord was ulcerated completely through; no pleural adhesions. There was a small calcareous deposit in the apex of the left lung, with smooth cicatricial puckering of the surface, which was spotted with black pigment. Lungs anæmic, saving slight hypostatic congestion.

The pericardium contained about seven ounces of serous fluid. Some altered black fluid blood and minute black coagula in all the chambers of the

heart; a decolourised clot of fibrin occupied the aortic orifice. Tissue and valves healthy.

Abdomen.—The capsule of the liver was opaque and thickened. The gland presented lobular congestion; the right lobe contained a small calcareous deposit resembling that found in the left lung. Spleen rather large, dark red, hard, and friable.

Kidneys swollen; displayed a congested appearance resembling that of the liver. Structure appeared healthy, though there was some thickening of the capsule. Remains of old adhesions in the neighbourhood of liver and right kidney. Mesenteric glands enlarged from irritation: no deposits on section. The ileum for its entire length displayed numerous oval moist gangrenous ulcers occupying the site of Peyer's patches, averaging in size 2 × 1½ inches. Similar ulcers were found in the cæcum. Excepting the congested glands and gangrenous parts, the body appeared almost drained of blood. There was no other appearance deserving of note.

Case 5.—Private T., 2nd Battalion, 25th Regiment, aged 24, employed on the works, five months at Newera Ellia, healthy previous to arrival, never had fever previously. On 13th October felt pain across the bowels, and slight headache. On the 14th, headache was increased, tongue furred, bad taste in the mouth, pain, and deep-seated tenderness in both iliac regions. At ten A.M. he was attacked with a typical paroxysm of quotidian ague, for which he was treated by an ipecacuanha emetic, followed by quinine. The abdominal symptoms were relieved by a mustard poultice. There was such manifest prostration as to indicate early and free use of nutrients and stimulants. He did not pass into a decidedly typhoid state, and gradually recovered well.

This hybrid fever was preceded by typhoid symptoms often so slightly marked as to be readily overlooked. The first access of fever was typically periodic, and accompanied the increasing typhoid symptoms until it was dispersed by quinine. When this had occurred the patient ceased to tolerate quinine even in a very small dose; the medicine seemed not only to exert no beneficial influence upon the typhoid element of the fever, but, unless then discontinued, was rejected by the stomach; and it was only under such circumstances that a patient was heard to complain of its "bitterness." But if periodic symptoms returned, the patient would again tolerate quinine. Whenever typhoid and periodic symptoms co-existed, a combination of quinine and hydrochloric acid seemed beneficial, and was taken well; the usual dose of hydrochloric acid was 20 minims of the dilute acid. Quinine was generally given in five-grain doses, repeated according to circumstances, the patient sometimes taking 20 grains, or even more in the day, without cinchonism. This tolerance of quinine indicated it at the same time that it served as a measure of the intensity of the malarial poisoning.

It is to be regretted means were wanting to obtain a thermometric curve, as judged by the hand, the temperature was very high. Percussion during fasting generally detected a swollen condition of the spleen; but it was not so much enlarged that the edge could be felt. This absence of any excessive enlargement of the spleen seemed fairly attributable to early and free administration of quinine in all the cases. For the writer had observed, during two years' experience in British Guiana (a most malarious climate), that in cases thus treated, the spleen did not enlarge, although, under other circumstances, enlargement was exceedingly common, occasionally extreme, and often affected even the children of natives in the more unhealthy localities to the extent of producing ascites and the most extreme anæmia. The connection between "Ceylon tongue" and *typhoid fever* is of interest. "Ceylon mouth," or "sore-tongue," prevails in the Central Province, as well as on the sea-coast. It exhibits many degrees of intensity from desquamation of epithelium, producing a glazed appearance, to such extensive superficial ulceration as to interfere seriously with deglutition. A European child, under the writer's care at Newera Ellia, was in some danger of starvation from this cause (contracted at the station); it was so difficult to induce the little patient to take any nourishment. Previous to ulceration the tongue frequently displayed a strawberry appearance, from elongation of the filiform, and swelling of the fungiform papillæ, attributable to the irritation caused by a fixed acid (detected in the saliva), which seemed produced by a fungus.

The urine exhibited the same intense fixed acidity. Some degree of this morbid state of tongue commonly manifested itself during the course of any serious febrile disorder at the station, was always preceded by lassitude, often by frontal headache, and invariably alternated with diarrhœa, indicating alvine irritation, and an instinctive effort towards the elimination of a poison by the *intestinal glands*. Microscopic fungi* abounded at the station. Growing mycelium could generally be obtained by scraping the lingual ulcers which tended to assume the circular disposition, described by the Rev. M. J. Berkely as a peculiarity in the growth of fungi.

Contemplating those facts with the light shed upon the subject by our knowledge of *tinea*, it seems scarcely philosophical to regard their presence as merely accidental. They must at least play some part in the etiology of the local disease, and if so may they not take a part in the development of the constitutional malady also? Demonstration of the minute sporules in the blood corpuscles, and the fresh excretions of the skin and kidneys, under circumstances (published in last annual volume of the Department) calculated to exclude fallacy, prove at all events the transit of their germs through the circulation. Might not those germs, under ordinary circumstances, obey the general law that parasites do not as a rule tend to destroy the life of their host, but may, under exceptional conditions, constitute, convey, or elaborate a specific poison? The known danger of disturbing accumulations of excreta during epidemics may possibly indicate this, as it tends to dispersion and development of fungus elements which, if undisturbed, retain for long, perhaps for indefinite, periods a quiescent phase. Another point of interest is the possible connection between microscopic fungi and the *black pigmental deposits* found in the glandular organs, especially after long residence in malarious climates, as careful observation and experiment (during the prevalence of malarial disease at Jaffna, in 1866) proved a similar black amorphous or granular substance to be a product of fungus decomposition. Even the circular form of this deposit may be suggestive, especially as seen upon the surface of the lungs, where it frequently exhibits the spotted disposition of chloasma.

It may also be worth recording that, although the urine in malarial disease is usually pale, yet the addition of a mineral acid very commonly (according to the writer's experience in Ceylon) changed it to pink, red, or almost black, indicating, by the detection of the hæmatine compound, excessive disintegration of the red corpuscles, which might not have been suspected but for this effect of the acid.

As regards the etiology of the typhoid element of the fever, the latrine arrangements seem to have been made without any precaution against the communication of disease by excreta; and a fatal case of typhoid fever had occurred in the detachment during the previous year. All the latrines at the station consisted of mere pits in the decomposed gneiss, a substance almost as hygroscopic as a moist sponge. In the case of the smaller latrines, as at the officers' and detached married quarters, it was the custom to place the unguarded cesspit under the roof of the dwelling. On representation of the extreme danger of this arrangement, they were cleaned out and altered to suit the dry method. The barrack latrine had its cesspit in communication with the stream which constituted the sole water supply of a small native village, about 1,000 yards (allowing for windings) *down the stream*. This village contained a small provision shop for the convenience of the detachment and of travellers on the road through the valley, and on occasions of pressure provided lodgings for the families of convalescent soldiers. When the danger of this want of precaution was represented, the evil was remedied and a new latrine

* It may be interesting to record that all attempts to bake bread in large quantity, and of even tolerable quality, have hitherto failed at Newera Ellia. This seems dependent upon some change in the yeast, as the bread never can be got to rise and soon becomes sour. The ration bread is brought from Kandy, a distance of 48 miles, is four days old when issued to the soldier, and during the wet season is almost always mouldy. Professor Lindley, in his work on the vegetable kingdom, refers to examples of similar failure which he attributes to a fungus, and recommends a trial of fumigation of the bakehouses by sulphurous acid.

was constructed, but, unfortunately, on the old plan of an ungarded cesspit, and nearer to the barracks. Within about three months the surrounding porous soil became so saturated with sewage that, on strong representation of its danger, a barrack latrine and urinal on the dry plan were sanctioned by the authorities.

The pressure of an immense body of water from the mountains, and the extremely porous character of the soil, render the system of unguarded cesspits peculiarly unsuitable to the station; while, on the other hand, existing attempts at cultivation, and the poverty of the ground, make any attempt to utilize sewage deserving of trial. The only drawback is the scarcity and expense of labour.

All possible precautions were taken to prevent the disease spreading. The evacuations were received in vessels containing strong disinfectants promptly removed, and deeply buried apart at a safe distance from buildings and streams. The bedding was disinfected, and in the fatal case a portion was burnt. Disinfectants were freely and constantly used in the wards, which were well ventilated. Lime-washing the walls was thoroughly carried out. The ward next the latrine was disused, and the number of patients in the remaining ward was maintained at the lowest figure possible. A temporary dry earth latrine was put up, the old one was closed, its contents covered up with dry earth, removed so soon as it was considered safe, and the latrine was altered to the dry method. The hospital was soon after new floored, having been well cleaned and disinfected, and provided with ventilation underneath the floors, as well as with spouting (previously deficient) to the back of the roof. A plan for deep drainage was in contemplation when the writer left the station.

Dysentery appears to have become endemic to Newera Ellia in common with other parts of the island. The writer attended for symptoms of well marked acute dysentery a European infant, two months old, born at the station, and never off the Upper Plain. The infant was artificially fed, and had water given to it with the milk. The native servant, whose duty it was to procure good water from some distance, brought instead stagnant water from the neighbouring swamp. This was given to the child with its milk. When a tumblerful was set aside for some hours it deposited about a teaspoonful of earthy-looking sediment. Very prompt treatment was necessary to relieve the symptoms, but the child ultimately thrived remarkably well upon pure cow's milk.

A European female infant, three months old, born at Newera Ellia, and never off the Upper Plain, presented every symptom of acute dysentery in miniature. The etiology was not so clear as in the former case, but it may be worth mentioning that the illness set in as the mother was recovering from a protracted attack of the same disease.

In some other instances the writer has been consulted for infants passing blood and suffering from tenesmus, &c., and has invariably relieved them by having pure milk substituted for the milk and water; in slight cases without any other treatment. For the milk at the station as a rule was good, but the water was often bad, and generally to be suspected.

A burgher proctor, an elderly man, resident at the station, enjoyed good health until he removed into a new house adjoining the native bazaar, destitute of drainage, having a freshly-cut bank of decomposed gneiss almost in contact with the rear wall, and provided with a sunken earthen floor. After having slept one night in it he experienced symptoms of acute dysentery. He was persuaded to change his residence, and on having done so, improvement became at once apparent. He recovered, but was much shaken by the attack.

Two European adult residents on the Upper Plain suffered from protracted attacks of dysentery, evidently contracted at the station.

A case of the same protracted character, tending to the chronic form, was treated amongst the few natives in the small village near the barracks. And, on the hill dividing the upper from the barrack plain, a discharged European soldier, of broken-down constitution, employed as sexton and letter-carrier, died with marked symptoms of acute malignant dysentery in its worst type. His house was in the graveyard, and was in a very bad sanitary state.

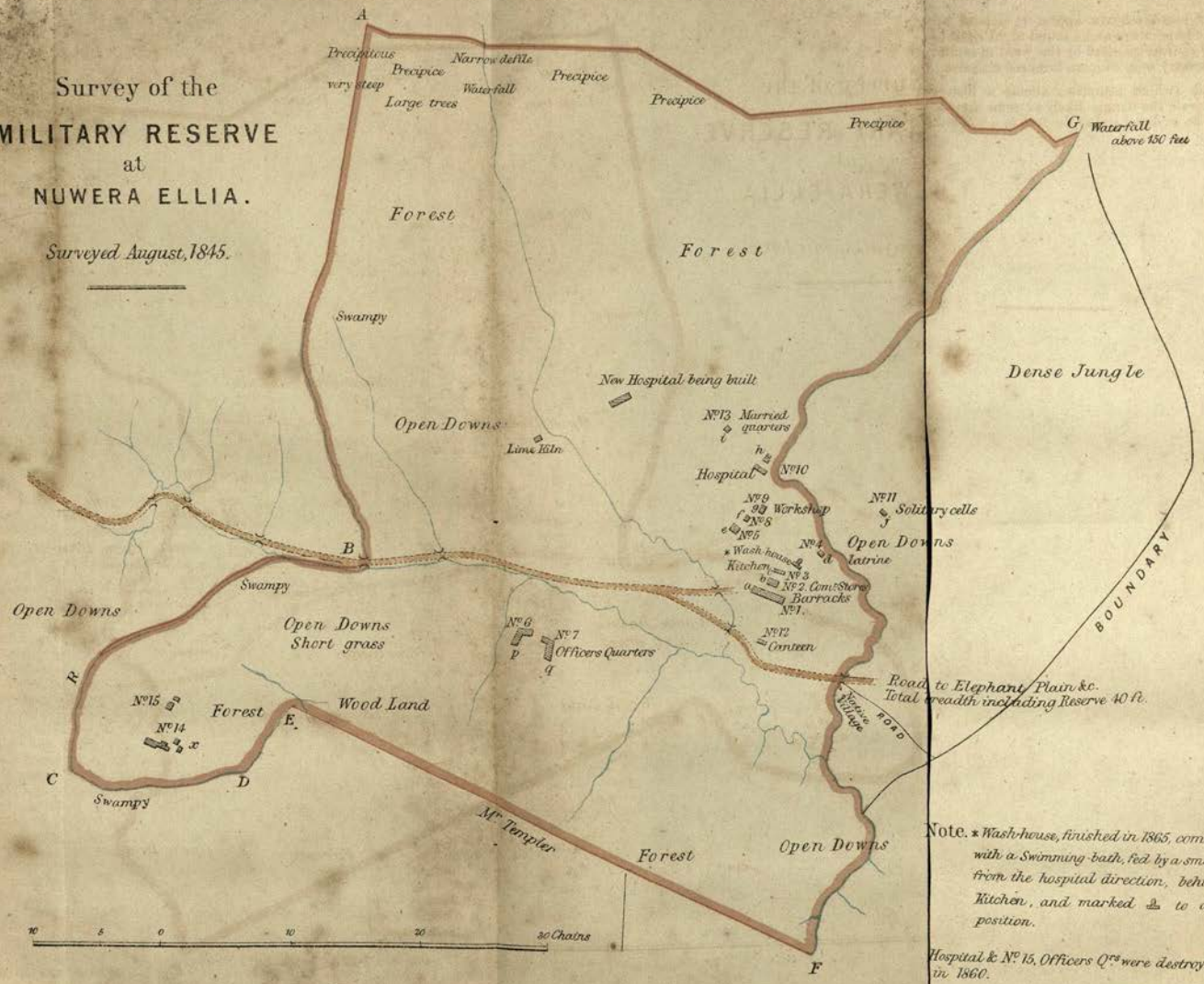
As a rule the climate is not suited to chronic dysentery. Its beneficial

effects upon the tropical cachexiæ appear to depend upon the invigorating influence of a cool temperature and a sound night's rest; but those advantages may be sometimes counterbalanced by the want of sanitary precautions which are considered necessary even in more favoured climates.

NOTE.—A map (which comprises almost a history of the station) is appended to illustrate the danger likely at some time to arise from want of deep drainage for an inclosed site at the foot of a wooded precipice.

Survey of the MILITARY RESERVE at NUWERA ELLIA.

Surveyed August, 1845.



Note. * Wash-house, finished in 1865, communicates with a Swimming-bath, fed by a small stream from the hospital direction, behind the Kitchen, and marked ⛲ to denote its position.

Hospital & № 15, Officers Qrs were destroyed by fire in 1860.

APPENDIX No. L.

REMARKS ON MALARIA.

By Staff Assistant-Surgeon Wm. Hensman.

The complete effects of the malarious poison on the human body, as seen in attacks of ague or remittent fever, are well known, but in what manner those singular phenomena are produced, which distinguish this from all other kinds of fever, has not yet been established. For this reason I have thought that any inquiry into the action of the poison will serve a useful purpose, if it leads in the direction of that exact knowledge of miasmatic influence which sooner or later will enable us to define its sources, its aggressive limits, and be made the means of its prevention and cure.

I regret that, owing to the difficulty of obtaining access to Colonial documents, I am unable to furnish statistical papers of the health of the civil community of Hong Kong; but perhaps the omission is of less consequence, as the facts stated concerning them, and their comparative immunity from fever, as spoken of in the paper, are matters of common knowledge amongst all who have been stationed on the island. I also regret that at this distance from the corps I am unable to give statistics of the 2nd Battalion 20th Regiment, in support of the facts related of them. The statements may, however, be verified by an examination of the regimental returns during the period.

It is probable that all febrile attacks induced by miasmatic causes, from the fatal remittent, bordering on yellow fever, with complete prostration of the nervous system and disorganisation of tissue elements, to the hardly perceptible movement betrayed by occasional flushes and heat of the palms of the hands, and malaise, are the result of one specific poison acting upon the human frame with a various force, according to its intensity and the resisting power of the individual; for in the same locality all the varieties of malarious fevers are produced, and are seen co-existing amongst a body of men, or following in succession in an individual: thus remittent fever co-exists with intermittents in a battalion, or is followed by an intermittent in a subsequent attack in an individual. In the same ward of a hospital, remittent fever is in one case intensified almost into a fac-simile of yellow fever, or in another is with the utmost difficulty distinguished from quotidian intermittent; tertian may become quotidian, or decline to quartan during those seasons of the year when the malarious poison is presumably more or less active; and the action of the poison flickers out, as it were, with irregular forms of fever and neuralgic affections; and such a series of changes of type, from major to minor, accompanies the recovery of a regiment suffering with remittent fever upon its removal to a station where malarious fevers are not endemic. For instance, the 2nd Battalion 20th Regiment suffered severely with remittent fever at Kowloon, Hong Kong, in 1864; and during its worst prevalence were ordered to Yokohama, where malarious fevers are not endemic. There remittent gave way to quotidian, quotidian to tertian, and tertian to quartan—the disease dying out in about a year with irregular and slight attacks of ague. The regiment were ordered again to Hong Kong, and, predisposed, were again simultaneously smitten in large numbers with every variety of malarious fever, congestive remittent, quotidian, tertian, and quartan intermittent. The identity of the poison, and the common origin of all the types of malarious fevers, herefore seems to me nearly certain; and each one of them, as compared with a milder form, may be considered as denoting either greater intensity of the poison or less resisting power of the individual.

Malarious fever might well be called a disease of the sympathetic, for its chief symptoms proceed from injury to the organic system of nerves, upon which the malarious poison exerts a change such as leaves behind a kind of

latent affinity for its action, so that its subsequent normal state is more easily disturbed than before by the presence of its new relations; and a return, after long absence, to the habitat of malaria is generally attended with an acquired susceptibility to the disease.

The resistance to the poison under conditions which strengthen and sustain health or nervous force is often long, and sometimes successful; the habits and modes of life which expend or deteriorate health or nervous force predispose to an attack; a very large amount of nervous strength is required to withstand the depressing influence of malarious poison, and an expenditure of that strength is throwing away our only defence, and exposing the constitution to an early attack.

The circumstances of a soldier's life in tropical countries are not invigorating, however much care and forethought may be employed by those in command of him. The night-guard, the close atmosphere of the barrack-room, ennui, his own irregular habits, and intemperance, are provocative of a condition of the nervous and vascular systems least able to contend successfully against the depressing effects of a morbid poison. In other words, they create a receptivity for the disease, and invite and accelerate its action; and there is found to be a very close correspondence in Hong Kong between the invigorating habits and circumstances of the individual and his liability to fever. The wealthy civilian, with his spacious and elevated residence, his nights in bed, his life of business excitement, healthful activity, agreeable pleasures and comforts, enjoys a comparative immunity from the fever which desolates a regiment. On this account, those who are ignorant of, or those who do not consider the true action of malarious poison, think it strange that this disease is so unequally felt amongst the inhabitants. Even in a regiment this scale of liability is clearly manifested, the duty men suffering soonest and oftenest, the non-commissioned officers next in order, then the bandsmen, and least of all the officers. The officers are not quite as free from fever as the generality of the merchants: these last maintain the highest condition of health in that colony. Therefore the fever and its type may be said to be dependent on—first, the intensity of the poison; second, the receptivity of the individual; and, third, the amount of exposure. The first is beyond our control, the second is very much within our power, and the third altogether under our command. Now of all the causes which create a receptivity for the disease, a previous attack is the first in order, consequent on that acquired predisposition alluded to above; after which comes that long list of powerful causes from imperfect hygiene, among which may be enumerated defective barrack accommodation, a defective scale of rations and diet, excessive labour, overstrained amusements and fatigue, excess of any and every kind—all act in depressing vigour and vital power, and diminishing resistance to disease. The amount of exposure is clearly under our command; we know where the enemy is to be found, and the time of year, and even of the day, of his greatest activity; we can avoid occupying barracks in low-lying, ill-ventilated, humid, or otherwise unsuitable positions; marching men, except in emergencies, through malarious districts in malarious periods; multiplying night-guards; harassing men under arms, &c.

When at length the poison has overcome the resistance of the nervous system, depression of it is very soon apparent, and of the functions which are in dependence upon it. In fact there happens an attack of fever, and the cold stage of the paroxysm commences. Now the leading characters of the cold stage of fever are depression of nervous agency, loss of vitality and decadence of tissue elements, and vitiation of the blood; and these may be very slight, or they may be very severe, as in those cases where disorganisation of tissue is remarkable, and the nervous system so paralysed by the poison that the cold stage ends in collapse and death.

The attack commences with languor, weariness, and disturbed secretions; the earliest external indications which we have of weakened nervous force; but, indeed, these indications themselves are but the effects of foregone depression, and the real beginning of the attack—the initial movement towards disease, when the strength of the nervous system is overcome by the counter-strength of the poison, extends backwards far beyond our reach of observation into gland cell life and the intricate workings of the organism; and it is im-

portant to remember this, as it helps to explain a phenomenon of the disease, which will be adverted to, namely, its regular accession at certain hours.

As the attack developes itself, depression is soon more fully manifested in partial failure of nervous supply, such as feeble cardiac action, loss of capillary tone, internal congestions, diminished secretions, chilliness, and tremor: and proceeds in the severest instances, as before said, to suspension of nervous influence, as in suppression of secretions, muscular paralysis, subsultus, collapsed circulation, and death. Generally, however, this extreme degree of nervous depression is not reached, but the second, or hot, stage supervenes, and nervous depression is masked by vascular excitement, and provoked into excitement and activity by the irritation of the impure blood acting upon the vaso-motor nerves, and through them upon the nervous centres of circulation. An instance of the admirable conservancy of nature, by which the impurities are the means of exciting their own removal, and the purification of the blood is hastened and restored.

The origin of the second, or hot stage, or stage of reaction, or vascular excitement, is in the capillaries, from innumerable sources of chemical action and heat in numberless atoms of disintegrated tissue, which have suffered decadence and disintegration from failure of vital energy and cohesion during the stage of nervous depression; its development is the course adopted by nature for the combustion of this broken-down material, and its removal from the blood; and its decline marks the completion of the oxydising process, and subsidence of the attack.

Reaction, then, commences with the oxidation of the first atoms disintegrated, at this early period manifesting its presence to a thermometer before it becomes visible to our unaided senses; but by degrees acquiring intensity, and increasing in force, until it becomes the uncontrolable tumult we are familiar with during the height of the fever. It may be taken as a rough measurement of the dilapidation of the tissues, and of the severity of nervous depression. Reaction is a composite phenomenon, consisting essentially of two distinct processes—one of combustion and preternatural heat, the other of irritation and preternatural propulsion; the former due to physiological and chemical changes in the blood, which are consequent on the disintegration of tissue elements and their transformation into degraded elements fit for excretion; the latter due to the irritant qualities of the impure blood acting upon the vaso-motor nerves, and through them upon the nervous centres of circulation. It must be borne in mind, however, that nervous depression exists throughout the attack, increasing as it approaches, and diminishing as it recedes, from the favourite point of view—the rigor; it underlies the whole period of reaction, and affects the course and treatment of the entire disease. From the above we arrive at the conclusion that the period of depression and the period of excitement, or the cold and hot stages of fever, are mutually related and exactly proportioned, physiologically, to one another; this at first sight may appear contrary to all descriptions given of this disease, the "quotidian form of intermittent being said to have the shortest cold stage and the longest hot stage; the tertian a longer cold stage and a shorter hot stage than the quotidian; whilst the quartan has the longest cold stage and the shortest hot stage of all the varieties"; but a little consideration will show that these recorded facts are in perfect harmony with the views entertained in this paper, namely, that rapid oxidation attends rapid disintegration of tissue-elements, and rapid disintegration attends the severe cold stages of fever; hence, in quotidian intermittent, with severe depression of nervous force, disintegration being active, vascular excitement is quickly developed; but in the quartan, with slight depression of nervous force, disintegration is scanty, and the hot stage slow to establish itself, and sooner over. If we follow this principle to the remittent type, where nervous depression is most conspicuous and disintegration of the tissue-elements most remarkable, we find the cold stage still shorter, and the hot stage still longer, than in quotidian intermittent; the symptoms of nervous prostration, indeed, in this type are profound throughout, but the cold stage is shortest and the hot stage longest, and its supervention earliest of all the varieties of malarious fevers.

The feature which most distinguishes the malarious from other classes of fevers is its periodic character. In what does thi consist? It seems pro-

bable that the rate at which the poison is produced in the blood determines the frequency of the attacks and the length of the intermissions. We know that the malarious poison, like other organic poisons, finds a nidus in the human blood for its multiplication and increase, and that a very transient exposure in a malarious locality will be often sufficient to implant the germ of the disease, which, from its fertility, may, after an uncertain period, produce ague. It seems probable, therefore, that the poison accumulates in the blood until a certain culminating point is arrived at, when the equilibrium of the nervous system is overthrown, and the poison exerts its depressing influence. After that depression is past, and tranquillity restored, a certain intermission occurs, and the poison does not again display its power until, by reproduction, the explosive point is again reached, and the equilibrium of the nervous system again overthrown. The rate of reproduction then determines the periodicity or type of the fever; it may be so rapid that the depression of the nervous system is maintained, and the intermissions of fever are inappreciable, as in remittent; or it may be more tardy, and the intermissions wider, as in intermittents. In other words, the prevailing type of the fever is an indication of the force with which the malarious poison is acting in that locality, and of the rate of its reproduction in the blood. Now, as the rate of reproduction and force of the poison are governed by the external circumstances of climate, season, and station, and by the individual peculiarity of receptivity, and the amount of exposure, it becomes a natural inference that a body of men of the same nervous or constitutional power undergoing the same amount of exposure in the same locality would be affected with the same type of fever; and this is to a large extent proved to be the case by the prevalence of at one time remittent, and at another of intermittent, amongst them; but then these exact conditions are unattainable; there is no universal standard of constitutional power nor of receptivity; probably in no two cases is the amount of exposure precisely equal, and herein lies the explanation (and not, I believe, in the duality of the poison) of the variety of forms in which malarious fevers are seen to co-exist, forms which all resemble one another in being marked, pathologically and symptomatically, with the common stamp of their order, but differing in the degree not in thekind of individual poisoning.

Another distinguishing character of these fevers is the regular accession of the attack at certain hours, which is probably dependent on the relatively increased power of the poison during those periods of nervous depression which correspond with the diurnal declination of the barometer and electric tension: for when fever impends, such is the sensitiveness of the nervous system, that the slight depression of it which is presumed to take place during these diurnal periods seems sufficient to determine the attack. Now, the minimum period of electric force, and the greatest declination of the barometer needle take place about 4—5 A.M., and 4—5 P.M.; the morning minimum being the minimum of the 24 hours: and it is assumed that the diurnal declination of the nervous and electric forces correspond closely, with each other. Now it will be found that in a very large majority of instances the minimum period is the one during which nervous resistance is overthrown, and the poison obtains a predominance, *i.e.*, the cold stage of fever begins. This, perhaps, will not be immediately obvious, because it is customary to consider the tremor as the commencement of the cold stage, and tremor frequently happens when the minimum period has been sometime passed; whereas indications of nervous depression may be discovered for some hours before. A man suffers with languor and weariness and deranged secretions for hours before the "shakes" or the "shivers" seize upon him, and these last are the end, and not the beginning of the first stage of fever, which, as before mentioned, must be reckoned to include all that period from the earliest indications of nervous depression to the end of the tremor, and the commencement of this period will be found generally to coincide with a minimum diurnal period; and inasmuch as the minimum period of the morning is the minimum of the 24 hours, it induces by far the largest proportion of febrile attacks. These diurnal variations, although the chief, are not the only determining periods of febrile attacks, for any accidental depression seems sufficient, exposure to cold, or wet, or sudden apprehension, or depressing emotion,

and a return of the fever will often be induced by the irritation and depression following a debauch or excess of any other kind.

Again, the maximum periods of nervous and electric force are the periods during which, in a very large majority of instances, the hot stage occurs; the advent of a hot stage during the minimum periods will be acknowledged to be very rare, and fully two-thirds of them arrive at their greatest intensity sometime in the forenoon, the maximum periods of electric tension and the greatest exaltation of the barometer taking place about 9—10 A.M. and 9—10 P.M., and the morning maximum being higher than the maximum of the evening; but it is not here sought to make this period the determining period of the hot stage of fever, for this has been shown to be consequent and consecutive to the cold stage; nevertheless this period of nervous exaltation may, and probably does add something to and quicken the force of reaction.

It is curious to observe the strange caprice of malaria, in impressing on other affections a periodical character, and in no other kind of disease is a penetrating diagnosis more often needed in discovering the disguises of this subtle poison. A patient may be seized with diarrhœa, and after treating it for some days with simple remedies, its continuance will perhaps excite a suspicion of complication, and it will then be found to have a more or less periodic character. I think I have seen a large dose of quinine and opium, at once arrest the symptoms which, but for the administration, might have appeared to be an unaccountable disease of the bowels. The compound disease was deprived of its malarious element by the exhibition of quinine, and reduced to a simple affection, which then subsided with the usual remedies.

The same causes which are seen to produce this diversity of condition in the surface circulation operate upon all the remoter parts in a corresponding manner; and there is such uniformity in the whole design of this fever—considered apart from accidental or peculiar complications—that it is not difficult to foresee the consequences and follow the results. If we follow these consequences to the kidney we shall see that during the first stage of feeble and torpid circulation the secretion from it is diminished, but that during the second, or hot stage, and after, there is in the secretion a large increase of some of its proper elements, of urea and uric acid, the metamorphosis of disentegrated nitrogenous tissues, and of phosphates—the metamorphosis of disentegrated nervous tissue. The condition of the liver appears to be this: there is passive congestion during the stage of depression, with diminished secretion, which changes to a state of congestion more or less active as vascular excitement sets in; and this active congestion may at any time advance into a condition of inflammation, with any of its results—all the more likely if structural or functional disorder pre-existed. The more usual course in the majority of instances is that the active congestion subsides during the intermission, and the passive congestion recurs with every cold stage, until at last its power of recovery and resilience is lost, and enlargement from distension, and passive congestion from debility remain, with impaired function and imperfect elimination of bile. Precisely the same series of changes occur in the spleen, and its spongy structure suffers distension more readily, and loses resiliency sooner, than the more compact tissue of the liver, and therefore its enlargement is more frequently observed.

In connection with the splenic affection, anæmia, the constant sequel to malarious fevers, is said to arise, and, inasmuch as they are both concurrent effects of the fever poison, and its action on the nervous system, they are, no doubt, contemporary; but that they stand in the relation of cause and effect cannot be considered more than a very obscure and unsatisfactory explanation. Whatever may be the action of the spleen upon the blood, we are going out of our way in attributing the anæmia of malarious cachexy to its enlargement; besides, marked anæmia may exist without any enlargement at all. The true cause of the impoverished state of the blood is its mal-nutrition, and its mal-nutrition is the result of loss of innervation and power throughout that extensive system whose perfect function is essential to the renewal of healthy blood, namely, the lacteal and mesenteric systems; and, looking at the wonderful arrangement of vessels and glands spread over so large a surface, each contributing, by a delicate process of selection and refined elaboration, to the formation of the most highly organised fluid with which we are acquainted, it is not surprising that defective innervation should

be attended with defective composition; it is in the formative process that anæmia takes its rise, and it is by a restoration of that process to its full vitality that we must look for its removal.

Those remedies which are successful in checking the recurrence of the paroxysms of malarious fevers must range themselves in one of two classes—either amongst those which diminish the force of the poison in the blood, like quinine, or amongst those which increase the resistance and tone of the nervous system, like arsenic; all others are subservient, and are addressed either to the accidental complications which arise during the paroxysm, or to the sequelæ which ensue after. Quinine stands alone as representative of the first class; arsenic is the most distinguished of the second; but nux vomica, stimulants, especially wine, and many tonics along with proper nourishment, nursing and rest, range themselves amongst this class. Venesection takes the first, and alkalies, purgatives, cold affusion, emetics, a second place, amongst those remedial agents which are employed against the complications of the disease; whilst iron, general tonics, iodine, with change of air, are the principal means of encountering the sequelæ. Quinine appears to possess the invaluable properties of a destructive effect upon the poison, in combination with a tonic effect upon the nerves. As a tonic it is familiar to us, but its direct action on the malarious poison in the circulation has been denied. Now, although there is no actual proof, there is good evidence for believing that such, however, is partly its mode of action. Its prophylactic effect is probably due, not altogether to its properties as a tonic, but to its action on the poison; for if not - if its tonic action is its prophylactic power—why are other tonics impotent as prophylactics? Acting as a tonic simply, how does it prevent that accumulation or reproduction of the poison in the blood which necessarily precedes a fit of ague? If such were its only mode of action the poison would be left to multiply and accumulate in the blood to saturation, and the system would yield to its special influences. It may be said that, although prophylactic doses of quinine have been regularly given, still fever has occurred, but to be successful the dose of quinine must be proportioned to the dose of poison, and if the quantity of the latter circulating in the blood exceed, by ever so little, that which is acted upon by the quinine, and destroyed, the remainder will be left as reproductive and multiplying foci of the poison, and sooner or later will produce an attack of the disease. To give one or two grains as a prophylactic, in a district where severe remittent is the prevailing type of fever, is almost as useless as three or four grains would be in the actual treatment of the disease itself. If an average of fifteen or twenty grains daily is required to check the paroxysms in hospital, perhaps half the doese may be required as a prophylactic, or, at all events, a larger dose than is usually given. Perhaps the best manner of administering quinine to a patient in hospital is in the early morning, in such a dose as has an average success in arresting the paroxysms of the prevailing types of fever. There are several advantages in giving in this way: first, the period of administration is coincident with the minimum period of nervous force, and therefore, with the period when the system is in greatest need of support, and greatest danger of attack; secondly, it is generally well borne, and seldom produces uncomfortable sensations of giddiness, &c., whereas, some hours later, when the paroxysm is present, there is often much irritability of the stomach, and cerebral excitement; thirdly, it leaves the remainder of the day for the administration of other all-important remedies—effervescents, alkaline diuretics, purgatives, &c. Arsenic is famous for its consistent tonic action upon the nervous system; its use is greatest when quinine cannot be taken on account of idiosyncrasy, or when it has already arrested the further development of the poison, leaving an atonic and debilitated innervation; then it will effect a renewal of healthy function, and consolidate a cure, although in remittent and the severe types of fever, when reproduction is active and nervous power very low, it is not to be depended on like quinine, in the milder varieties, with less marked depression, it is able to raise the tone of the nervous system to a point at which the poison is unable to act upon it so as to produce its paroxysmal effects.

Nux Vomica.—There is no remedy which sustains stricken nervous force so powerfully, and none which re-invigorates languid innervation so well, as the the extract of nux vomica, therefore it is indicated during the cold stage of

the febrile periods, and during convalescence in doses of three grains daily, in combination with sulphate of iron and sulphate of quinine, it has a singular and remarkable effect. Under its influence nutrition is quickened, secretion becomes active and true, and excretion hastened; internal congestions are removed, anæmia vanishes, and the fresh colour of health again dawns upon the cheek.

Stimulants.—Wine is almost always well borne, especially during the intermissions; it recruits and sustains nervous power, steadies the pulse, and in almost all cases is a valuable aid in constructing a cure. Even in those cases where there is violent determination during reaction, and depletion becomes unavoidable, experience does not contra-indicate its moderate employment.

Physical Rest, Diet, Nursing.—There are few more restorative and tonic remedies in depressed nervous and constitutional power than rest in bed, good nourishment, and nursing; by these means the nervous and constitutional powers are reinforced, and slight attacks of fever are recovered from without much treatment of other kinds.

Venesection.—In blood-letting it will be remembered that we are treating a disease, whose origin and progress are based upon depression; and although, when active congestion threatens during reaction to pass into inflammation we must have recourse to it in order that tissue may be saved and function preserved, still, that its abstraction will assuredly lower constitutional power, and thereby assist the further development of the toxical action of the poison, by diminishing nervous tone, and so increasing susceptibility to its influences; therefore with a sparing hand the necessity must be complied with.

Alkalies.—One of the chief indications of treatment to be followed during the febrile periods is to disembarrass the blood of the impurities which stream into the general circulation from its capillary sources (and which, for the most part, afterwards appear as excreta in the form of urea, uric acid, urates, and phosphates), by assisting the depurative functions of the kidneys; in order that the debris of one attack may be cleared away as much as possible before the accession of the next; or, in the event of the paroxysms being arrested, that the blood may be prepared as soon as possible for the reception of those remedies, such as iron, which are not borne, whilst it is in an untranquil and inflamed condition.

Cold affusion is a valuable means of arresting cerebral complication, and if there is no diarrhœa, or pulmonary congestion, a stream of water may be directed from a tolerable height, and perseveringly employed until the head becomes cool. The use of it when fever is violent and cerebral heat and excitement high is most beneficial.

Purgatives.—Calomel and colocynth, or a large dose of calomel, followed by neutral salts, are most effectual in clearing a foul tongue, and clearing a path for other remedies.

Iodine.—The success with which the topical application of iodine discusses the malarious enlargements of the spleen and liver is worthy of notice, and its value appears to depend upon the irritation impressed on the cutaneous nerves, and conveyed by them through the spinal centre to the corresponding branches and ganglia of the great sympathetic, which supply the congested organ, exciting innervation therein, and restoring tone to the weakened tissues of the distended blood-vessels, whose calibre is thereby contracted, thus giving fresh life to its circulation, as well as new vigour to gland-cell agency: healthy function is renewed, whilst the volume of the organ is diminished. But it must be painted on several times in the day until the cuticle desquamates, and it will rarely fail to reduce the internal tumour.

The broken health of those who have suffered one or more attacks of fever, with congested internal organs, will hardly be restored whilst they remain within the reach of miasmatic influences. In those parts of the world where a comparatively healthy interval of the year occurs, they may regain much of their former appearance, but they will generally be valetudinarians, keenly susceptible of the faintest presence of their old enemy; and therefore, although iron and general tonics are given with much temporary benefit, change to a purer atmosphere is the *sine qua non* with those whose liability to the disease has become established.

APPENDIX LI.

CASES, &c.

A Case of Traumatic Tetanus successfully treated by Calabar Bean. Reported by Surgeon F. H. Macfadin, 13th Light Infantry, Gibraltar.

Private T. C., 1st Battalion 13th Light Infantry, was admitted into hospital on the night of the 24th December, 1867, suffering from a severe scald of both legs, caused by his having fallen into a cooking copper a short time previously.

The right leg was much the more extensively injured, particularly in the lower third, where the true skin was partly destroyed, and the tendo achillis laid bare. He was immediately seen by Assistant-Surgeon Hoysted, who dressed both legs with carron oil, covering the dressings over with thick layers of cotton wool. He complained of intense pain, although he was in a state of partial collapse. This, however, passed away in a short time.

Dec. 27.—In consequence of his complaining of great pain, and there being a profuse purulent discharge, the dressing was removed from both legs, when the left was found nearly well, and some sloughs on the right were beginning to be detached. Dilute oxide of zinc ointment was substituted, spread on strips of lint, and a grain of morphia was ordered at bed-time to produce sleep.

Dec. 28.—Pain in legs not so severe, and he slept for five or six hours. To continue draught and ointment as before.

Jan. 4, 1868.—The sloughs from the right leg came away, and the ulcers on the left have healed. He sleeps much better, and his appetite has much improved; bowels regular; tongue clean; pulse, 84. Application of ointment to be continued; to have the draught also every night.

Jan. 10.—Up to this date he progressed favourably, and the ulcers on the leg were covered with granulations and secreting healthy pus; but this morning he complains of stiffness at back of neck, pain shooting occasionally from the right heel through the muscles of the spine, and terminating at the nape of neck, with spasm across the front of the chest, and difficulty of swallowing, particularly solids. He could not open his mouth more than half-an-inch; pupils were contracted; the forehead and face had the expression peculiar to tetanus. The leg was now laid in a large poultice of linseed-meal, covered with olive-oil, and as his bowels had not been moved for two days he had six drachms of castor-oil, which operated. In the evening he was somewhat easier, the spasms being less frequent. Anodyne draught to be continued.

Jan 11.—Passed a very restless night. Did not sleep. The disease is now well marked, the muscles of the abdomen, particularly the recti, being hard and rigid; also the muscles of the back of the neck and the sterno-cleido-mastoid, and he had a slight attack of opposthotonos.

On consultation it was determined to try the extract of Calabar bean, the following formulæ being used:—White wine, 1 ounce; extract of Calabar bean, 12 grains; mix well. Five drops to be given in half-an-ounce of cold water every half hour. When he had taken six or eight doses, the muscles were not so rigid, and the spasms were less frequent, partially removing the difficulty in swallowing. Bowels were moved naturally; pulse, 100. Poultice to be applied to the leg every morning, and to continue the anodyne draught and solution of Calabar bean.

Jan. 12.—Passed rather a better night; ulcers on leg looking healthy. The muscles are still hard and rigid, but the spasms are less frequent, and he can open his mouth a little wider. Continue treatment.

Jan. 14.—Not so well. He had a well marked attack of opposthotonos, the body being arched, and he and the attendant state he had six such during the

night. The muscles of the abdomen are hard and tense, the recti standing out under the skin like ropes. Risus sardonicus well marked; cannot open his mouth so wide, and he has great difficulty in swallowing. He slept none during the night; pulse, 112. Bowels still confined. To have 1 ounce of castor oil, with 10 drops of laudanum immediately. The solution of Calabar bean and poultice to be continued, and to have hot fomentations with turpentine applied to the spine. He finds great ease by lying on his face.

Vespere.—Bowels were moved during the day, after which he slept for two hours, and he says he feels much easier; to continue the solution of Calabar bean every half-hour. When awake, anodyne draught to be repeated. Pulse, 92.

Jan. 15.—Passed a quiet night, slept a little, and was partially free from spasms, but the muscles continue rigid; pulse, 102. Says he does not feel so much difficulty in swallowing; pupils contracted; ulcer on leg healthy. Notwithstanding all the extras and stimulants administered, he is losing flesh considerably; to continue the solution of Calabar bean every half-hour; the anodyne draught at bed-time; the poultice to the leg, and fomentations to the spine.

Jan. 16.—Did not pass a good night, but slept a little towards morning; spasms less frequent, but all the other symptoms remain unchanged; pulse, 92; bowels confined; same treatment to be continued.

Jan. 17.—Had several attacks of slight opposthotonos during the night, when the body was slightly arched; muscles of forehead more contracted, and the muscles of the abdomen, neck, and spine are more rigid and hard. Says he is afraid to swallow, lest an attack might come on; pupils contracted; bowels confined; leg continues to go on satisfactorily; pulse, 100. To have 10 drops of the solution of Calabar bean every half-hour, fomentations and anodyne draught to be continued; to have one ounce of castor oil immediately.

Jan. 18.—Had no attack since the dose of the bean was doubled, but the muscles of neck and abdomen continue rigid; bowels have not been moved; to have a draught, at once, of rhubarb, magnesia, and Epsom salts. The solution of Calabar bean, &c., &c., to be continued.

Vespere.—Bowels moved several times, and he says he has not felt so well since he laid up; pulse, 84; pupils more contracted; brow not much; to have the solution of Calabar bean only every *hour;* anodyne draught to be repeated.

Jan. 20.—He continued to progress satisfactorily, and was free from spasms until last evening, when they returned, with sharp pain shooting from the heel, and affecting the muscles of the spine, right neck, and abdomen; he had also a slight return of opposthotonos; brow contracted, also the pupils; pulse, 104. To have the solution of Calabar bean, 10 drops, every half-hour. Bowels not moved since last reported. Ulcers on leg covered with healthy granulations; rhubarb draught to be repeated. Did not sleep during the night. Says he thinks the morphia prevents his doing so; this draught to be omitted. Poultice, &c., to be continued.

Jan. 21.—Bowels moved freely; has had no spasms, and slept four or five hours during the night; muscles of abdomen not so rigid, and he can swallow solids with little difficulty. Fomentations and solution of Calabar bean to be continued; also poultice to leg.

Jan. 25.—Since last report, he has had no spasm, and the shooting pain complained of in the heel has not returned, but the muscles of the neck, spine, and abdomen continue hard and rigid; he sleeps well now at night, and his appetite is much improved. Contraction of brow removed, and his countenance looks perfectly natural. No difficulty in swallowing; pulse, 84; bowels moved naturally; the granulations on the ulcers of leg are large; the poultice to be discontinued, and water dressing applied; solution of Calabar bean, 10 drops, to be continued every half-hour; fomentations to be continued also.

Jan. 28.—Going on satisfactorily; no return of spasm or pain, and the muscles are less rigid; pulse, 84. Says he feels much better, and he eats and sleeps well; bowels moved once daily; fomentations to be discontinued; solution of Calabar bean and water dressing as before.

Feb. 2.—No return o spasm or pain since last report; he can now open his

mouth widely, and the muscles have almost resumed their natural state; pulse, 78; bowels regular, eats and sleeps well, but he is very weak, and complains of feeling pain and stiffness in the muscles that had been affected. Ulcers on leg healed, except one on the outer ankle; to have 10 drops of the solution every fifth hour; water dressing to leg to be continued.

Feb. 7.—Ulcer all but healed. Can sit up in the bed. Complains now only of debility. Calabar bean to be discontinued.

From the commencement he had 64 grains of the extract, which produced a very depressing effect, besides removing the rigidity of the muscles.

He had daily considerable quantities of spirits, wine, and beer with a liberal diet.

Feb. 27.—This man is now able to get up, and take exercise in the ward.

A Case of Gunshot Wound by a Snider Rifle, followed by Amputation at the Hip Joint. Reported by Dr. Thomson, 76th Regiment; and Surgeon Dale, Indian Medical Service.

About nine o'clock on the morning of the 12th September, 1867, intelligence was brought to Her Majesty's steam transport "Jumna," laying in Trincomalee Harbour, that Lieutenant H., one of the military passengers *en route* to Calcutta from England, and who had gone on shore on a shooting expedition, had been some hours previously accidentally shot by one of his companions. He was a young man of fair complexion, sanguine temperament, temperate habits, and good constitution, 20 years of age, and of two years' service. In half-an-hour I started to Lieutenant H.'s assistance in one of the ship's boats to Foul Point, some seven miles distant, taking with me the necessary appliances. In about 1½ hours we reached Foul Point lighthouse, and found Lieutenant H., laying in a bungalow close by. He was quite sensible, but weak from loss of blood, suffering great pain. He had received a bullet wound in the left buttock, at 2 A.M., this morning, fired out of a Snider rifle at 30 yards' distance by his companion, who was kneeling at the time, and mistook Lieutenant H. in the uncertain light for a wild pig, a herd of the same being close by at the time. Lieutenant H. at the moment he was shot was on all fours stalking the pigs, and his friend being directly behind him (though unconscious of the fact) his buttocks were completely exposed to his fire. It must be mentioned that both gentlemen believed themselves to be distant from each other about a mile, at the time of the accident, and that the occurrence is greatly attributable to the carelessness of their native guides, whose business it was to keep them (as they had arranged on starting) at a safe distance from each other. Every attention was paid to Mr. H. after the accident; in fact, I found that everything had been done which it was in their power to do.

I put him under chloroform, and found the wound of entrance to be situated in the left buttock just above the nates, but without any wound of exit, the bullet having lodged. I made a careful examination with the finger and probe, and found that the ball had grazed the outer surface of the tuber ischii, which was roughened and denuded, and then passed across the ramus ischii, which was slightly grooved, although no splinter could be detected. The exact course of the ball after this could not be determined either by finger or probe, but from the direction of the wound upwards and inwards, the impression was that it had passed under the trochanter and become impacted there, or else imbedded itself in the soft tissues of the groin.

The wound was examined, but we failed to detect the bullet. I bound up the limb, and had him removed to the boat on a cot, and conveyed to Fort Frederick, the nearest attainable landing-place. Here a bungalow was placed at his disposal by the Officer Commanding the garrison, and I sent for the Senior Medical Officer, Trincomalee, and other surgeons within call, to hold a consultation. They each examined the wound carefully, but could not trace the bullet. There was no shortening of the limb or indication of fracture of the neck of the femur, no swelling in the groin, and as he made his water freely and naturally, no injury of the bladder. He complained of severe

nervous pain in the left knee and numbness of the left foot, owing probably to injury of the sciatic nerves.

I proposed to leave him at Trincomalee, but on account of the climate and the low situation of the officers' bungalows, and as it appeared that recovery from serious injuries was extremely tedious and uncertain, more particularly during this and the approaching wet season, it was considered there would be less risk in taking him on to Calcutta. He was accordingly removed on board the "Jumna," which was easily effected, and he is now comfortably placed in the Female Hospital, which is large and freely ventilated.

Sept. 13.—Passed a fair night, after two grains of opium; pulse 120; tongue white; urine free, high coloured, otherwise natural; bowels not open since the day before the accident; great thirst, some heat of skin; wanders slightly; wound discharges profusely thin sanious matter; very little swelling of thigh or hip, considering the nature of the injury, and very little tenderness on pressure; slight œdema of left leg and foot; some irritability of stomach, the result of the chloroform yesterday; wound syringed out with strong solution of Condy's fluid, and dressed with lint soaked in same.

Has beef tea and small quantities of wine, or brandy and water occasionally, effervescing drinks when thirst urgent. There is no ice on board.

Sept. 14.—Passed a middling night; had opium grog. Appearance of wound clean; thigh and leg as before; occasionally places his hand on the left groin, as if he felt uneasy there; no external indication of a foreign body in that quarter; wound dressed as before, discharge profuse; had an enema this afternoon, which produced a free and natural stool; urine as before; pulse 104; tongue white; wanders a good deal; nourishment as before.

Sept. 15.—Passed a restless night; wandered a great deal; severe paroxysm of pain in the wound, this afternoon, which fomentations, and an opiate relieved; wound as before, discharges freely; takes his nourishment well; pulse 104.

Sept. 16.—Passed a restless night; delirious at times; is more so to-day than he has been yet, in fact, regular traumatic delirium is evident. Wound discharges profusely thin sanious matter; looks clean, and is kept sweet by free use of Condy's fluid.

Bowels opened freely and naturally this afternoon; takes his nourishment well (soup and stimulants); pulse from 96 to 104; tongue white, but not coated; urine free, high coloured; slight heat of skin, but chiefly in the palms of his hands.

6·30 P.M. Delirious; opium, gr. iij. 10·30 P.M. Slept none; raves, and wants to get out of bed. Repeat opium, gr. iij.

Sept. 17.—He slept none all last night, although altogether opium gr. ix had been given at intervals. He is now, at 8 A.M., sleeping soundly; pulse 100, soft. 10 A.M. Slept for about two hours, and is quieter, though only partially rational. Wound looks as before. To continue the food, &c. Afternoon. Bowels moved; has taken beef tea, and a glass of beer. 8 P.M. Bowels moved again, rather loose; ordered an ounce of port wine occasionally; at 8·30 I gave him a drachm of Battley's solution.

Sept. 18.—Passed a quiet night, having slept a good deal; feels easy; pulse 102, soft; tongue cleaner; very profuse discharge from the wound, brown-coloured, sanio-purulent. A small scale of bone was removed from the mouth of the wound, where it was lying loose, about the size of a little finger-nail. Examination of the wound with the finger discovered deeply seated, but detached, a small body which, when removed, turned out to be the wooden plug which passes through the cone end of the Snider bullet. Nothing further was detected. Still wanders in his speech; takes his nourishment well.

Vespere.—Bowels opened twice since 3 P.M., of a loose, bilious character.

Sept. 19., 7·30 A.M.—At 11 P.M. last night got a draught containing a drachm of Battley's solution; passed a restless night till 4 A.M. his bowels being again moved once. Half a drachm of the solution was given in addition, and he slept for a couple of hours, and seems drowsy now; pulse 102, soft; tongue white, skin cool and moist; perspired greatly in the night from the excessive heat. (The vessel was off the Sandheads all night). *Vespere.*—Off Saugor Island, at anchor. Passed a fair day; rather restless this evening; tolerably collected; very little fever; complains much of nervous pain in foot of affected limb; discharge

from wound profuse, more purulents of a healthier character; gave at 9 P.M. a drachm of laudanum; slight tendency to flatulent-distention of the abdomen; bowels not moved.

Sept. 20.—Diamond Harbour. Slept an hour or two first part (7 A.M.) of the night; dosed a good deal afterwards; very restless towards morning and inclined to delirium; pulse 120; wound discharging very profusely purulent matter; wound looks clean and healthy; takes nourishment well.

3·30 P.M.—Diamond Harbour, at anchor. Complained much of pain in the wound before and after dressing it. Has slept none since early morning; much uneasiness in left foot and knee; gave a drachm of laudanum; pulse 120.

Sept. 21.—Same report. Slept better; bowels opened loosely twice through the day; pulse 120, weak; wound discharging profusely; takes nourishment well.

Sept. 22.—Passed an indifferent night; a drachm and a-half of laudanum was given; looks worse; hectic flush; pulse 120, weak; raves at times, at others rational; wound discharging. Diamond Harbour. A small scale of bone came away in the discharge. *Vespere.*—Weak and anxious; bowels opened thrice loosely since morning; dark bilious in character; gave an enema of starch and laudanum, which came away in less than an hour; then gave half a drachm of chlorodyne; since then no motion; have given brandy and water occasionally, chicken soup, and arrowroot, with port wine; pus seems to bag just below the orifice of wound; pressure discharges a large quantity.

Sept. 24.—Handed over to Officers' Hospital, Fort William, in charge of Surgeon Dale.

(*Case continued by Surgeon Dale.*)

Sept. 24.—On his arrival at the Officers' Hospital his appearance was pale and anxious; pulse 126; tongue clean and moist; skin moist, and tolerably cool, except the palms, which were hot. On his admission he almost immediately passed his water, and his bowels were open. The urine was natural, and the stool loose and bilious. On uncovering him, shortening of the left leg was at once noticed to the extent of about 4 inches. The leg, too, was powerless, and had to be kept in position by pillows; but unless moved, he complained of no pain in it. Moving, however, caused him great pain, especially in the knee and ankle. On further examination a wound was apparent in the left buttock, from which an immense quantity of thin pus, of an offensive smell, poured—the smell indicating dead bone. The wound was immediately dressed, the matter being pressed up, and the opening syringed with a solution of Condy fluid water. Being exhausted by the journey, no examination was made with a view of ascertaining the exact nature of the injury, it having been resolved that he should remain quiet the first day, and that a Committee of Medical Officers should assemble in consultation on the following, to make the necessary examination, and, if found necessary, to operate.

On the dressing being completed, one drachm of Battley's solution was given, and some iced brandy and water. A nourishing diet, and brandy and port wine were ordered. Among the more prominent symptoms calling for remark were the anxious expression of countenance, great debility, and wandering of the mind. When his attention was fixed, he talked and answered questions rationally; but a low muttering, rambling delirium was present the whole time; and to me there appeared symptoms of incipient pyæmic mischief having commenced. During the day he continued much in the same state, taking nourishment and stimulants freely. The wound was dressed again at 7 P.M., and one grain of morphia, with ammonia and camphor mixture, given; to be repeated if necessary.

Sept. 25.—Had a restless, sleepless night, notwithstanding that he took the second dose of morphia; was delirious, and talking incessantly; not so well this morning; pulse 136; tongue dry and brown (though it got moist afterwards, and the dryness might have been produced by the opium); is weaker, and the delirium increasing. He hardly recognised people whom he knew at once yesterday. Wound dressed at 7 A.M.; the same profuse offensive discharge; passed his water several times, but bowels not opened since yesterday expression very anxious and restless.

At 10 A.M. a number of Medical Officers met in consultation; and after hearing Surgeon Thompson's history of the case read out, it was determined to put the patient under chloroform, with a view of making a thorough examination, and determining what should be done. Chloroform was accordingly administered, when it was discovered that the head of the femur had been fractured, the hip-joint opened, and the acetabulum (edge of it) denuded. Fracture of the pelvic bones was also suspected, but could not be determined; but fracture of the femur across the neck and head was diagnosed.

A long discussion ensued, and it was ultimately determined that the only chance (and that a very desperate one) of saving life was to amputate at the hip-joint. One of the Surgeons was anxious that resection should be tried first, the operation being turned into amputation if resection were found impracticable; but this was overruled, as it was judged expedient to complete the operation with as little delay as possible, stimulants having been administered in the interval. The Committee reassembled at 3 o'clock, and Lieutenant H. having been made to understand that an operation must be performed, and that his friends had consented, chloroform was again administered, and he was placed on the operating table at about 3·30 P.M., and the operation performed (at the request of the relations) by Dr. Fayrer, in the usual manner, by anterior and posterior flaps. Little blood was lost; and upon the thigh being depressed, after the anterior flap was made, the neck of the femur was found to be fractured completely across, so that the knife passed between the fractured ends, allowing the posterior flap to be rapidly cut out. On the posterior flap being completed, the limb was separated, and the head of the bone dropped down in two pieces, being split across. Half of the bullet was at once discovered imbedded in the soft parts near the joint, and shortly afterwards the other half was found, the bullet having split upon striking the bone. The edge of the acetabalum was found denuded to a certain extent, as also the edge of the ramus of the ischium; but no fracture of the pelvic bones could then be discovered.

During the operation the pulse became very low and fluttering, from the effects of the chloroform. Recourse had to be had to ammonia and cold water; and the tongue was seized and drawn forward, and kept so for some time. The leg was amputated in about 20 to 22 seconds, but the tying of the arteries and bringing the flaps together occupied some time. He recovered from the effects of the chloroform as the operation was completed, and was transferred to his bed again about 4·30 P.M. He was very weak and low, and fainting threatened soon after he was put to bed; but brandy and water being freely administered he revived. A pint of champagne was subsequently given, and he dropped off into what appeared to be a dose. He awoke with a kind of start, and shortly afterwards it became apparent that he was sinking. The breathing became hurried and difficult; the pulse small, thready, and hardly to be counted; the eye became glazed, and the pupil fixed; and he died quietly at 20 minutes to 7 P.M.

Post-Mortem Examination, 15½ Hours after Death.

Sept. 26.—There was little or no decomposition, the body having been surrounded and sprinkled with M'Dougal's disinfecting powder.

Chest.—Pleura healthy, no effusion; pericardium ditto.

Lungs.—Exsanguine, crepitant; posteriorly, some patches of hypostatic congestion; one or two commencing patches of pyæmic mischief in lower lobes of each lung.

Heart.—Healthy in structure; right ventricle nearly filled with firm ante-mortem fibrinous coagula, and some recent post-mortem coloured coagula. The fibrinous coagula extended into the pulmonary arteries. The right auricle contained but little fibrinous coagulum. The left ventricle was quite natural. The left auricle contained a small ante-mortem white coagulum. Valves and muscular structure of the heart normal. The exsanguine state of the lungs corresponded to the suppressed supply of blood from the right side of the heart.

Liver pale; rather fatty.

Kidneys and Spleen quite healthy.

Peritoneum of pelvis and bladder discoloured, probably incipient decomposition; no pus; no structural change or injury; no peritonitis; but in the left

side of the pelvic cavity, under the peritoneum and fascia, and corresponding to the denuded bone outside, there was a collection of about four drachms of dark-coloured pus. The soft parts in the vicinity were matted together, as though by inflammation.

The left os innominatum was removed for more perfect examination. It was found that the tuber ischii was grooved by the ball, and that the bone was split and fissured in two places. Near the spine, and across the ramus of the schium, extending up to the acetabulum—the articular surface of which latter was also slightly fissured—the outer surface of the acetabulum was also denuded of periosteum; and there was a sloughy-looking surface of the cavity where the ball had lodged. The tract of the bullet was granulating, but was enlarged by sloughing.

Two Cases of Injury from the Bursting of a Gun. Reported by Surgeon H. B. Franklyn, R.A.

1. Gunner W., an Englishman, aged 32, service nine years, was standing No. 2 at a 32-pounder at Blockhouse during the naval review, when the gun burst, and he and No. 3 were blown over the parapet into the moat (a height of about 30 feet) into the water. On being brought up to hospital with a tourniquet on each arm, he was found to have received the following injuries:—The left arm was shattered halfway up to the elbow, and the hand destroyed. The right arm was burnt and otherwise injured; the hand also, and its deep flexors exposed. The mouth was torn away laterally on the right side. The face was much burnt and blackened, and the eyes looked nearly destroyed. The left leg was much burnt and blackened from the hip bone to the ankle, and there were several wooden splinters on this and the opposite leg, both in the calf and the thigh.

The shock was of course very great, and no chloroform was ventured on.

Treatment.—Amputation of left arm below elbow; two vessels and a little branch were secured.

Amputation through the metacarpel bone of the right thumb, and the hand wherever it was torn was sutured. The mouth was also sutured, the face dressed with diluted glycerine, the legs and the hand were kept moist and closed from the air, the hand having a bread poultice over the entire palm; and as soon as the skin stripped from the leg, which it did shortly in its entire length, it was powdered with chalk, and then had magnesia ointment applied.

A little brandy and water was given at once; febrifuge moisture through the night and an opiate. Remained in a measure stationary for two days, with some little fever.

19. A splinter was removed from the right thigh. His diet was arrowroot, beef-tea, a little brandy and water, and eggs.

20th. Eyes discharging very much, all other symptoms about the same; eyes syringed.

21st. Going on as well as can be expected, His face is kept cool by constant fanning; the swelling is subsiding a little. Same medicine and extras.

22nd. All the dressings removed; wounds washed with water, and disinfecting fluid, and oak bark decoction applied, and ice water alone to the stump and hand.

23rd. Did not pass so good a night. The oak-bark decoction was removed, and simple ice water applied again. Hand commencing to throw off some sloughs.

24th. The symptoms and state of the man are favourable; asked to be allowed to smoke his pipe a little, as his mouth is healing well. Eyes a little better, and one he can open and see with slightly.

25th. Doing well; stump healing; leg very painful; some sutures of stump breaking away, and now removed; left eye swollen and painful; syringing continued, and poppy lotion applied warm to it.

27th. Eye swollen and puffy. In addition to using much disinfecting fluid in the ward, vessels of solution of permanganate of potass were placed in different parts of it, and a ring of lunar caustic made to circumscribe the part of the face and eye, which looks puffy, and a purgative given.

28th. Continues doing well; puffiness subsiding, sutures removed from

stumps; scabs removed from the leg by means of poultices; another wooden splinter extracted from the left calf, leaving an ugly wound, which is being poulticed.

29th. Progressing well; ligatures have not yet come away.

30th. A rush of blood from a deep vessel of the palmar arch as the sloughs separated; lost about 6 to 8 ozs. of blood: it was stopped with perchloride of iron, and compress to palm, and a tourniquet *pro tem*, with a pad over each artery of the wrist; extras stopped.

31st. No return of hæmorrhage. Omit extras, excepting a litte brandy and water.

August 1st. No return of bleeding.

Vespere. Another splinter removed from the thigh.

2nd. All dressings removed from the hand which looks well; no more bleeding; thigh healing rapidly. Eggs, tea, and brandy given again as extras.

3rd. All the injuries going on well; the vision has returned to right eye, and partially to left, the conjunctiva of which hangs down in a curtain; sulphate of zinc lotion applied to it.

4th. Going on well; ligatures have come away from the vessels.

5th. All going on well; resume applications.

6th. Hand granulating, and thumb-stump healed.

7th. Doing favourably; pressure on palm, which had been made with wood, and compress removed.

9th. Doing well; all dressings renewed. Left arm healed (the 22nd day)—nearly by first intention.

10th. Doing well.

11. More secondary hæmorrhage from hand; stopped with ice, compress, and tourniquet; only 3 ozs. of blood lost.

12th. No more hæmorrhage; hand brought up over the chest; pressure relaxed. A few more extras allowed, including a pint of stout.

14th. No more hæmorrhage.

15th. Two splinters of bone extracted from the palm.

16th. It was now painted with strong solution of caustic to check the granulation.

17th. Wound of hand contracting. A fresh application of caustic to-day.

18th. Hæmorrhage has occurred three times, but was soon stooped; 1 to 2 ozs. lost each time.

Vespere. Hæmorrhage to a slight extent occurred three times since morning. Were it not for the two pieces of bone having been extracted, I should have tied the arteries of wrist to-day. Pads applied to these and a tourniquet, and liq. plumbi diacet. solution to the palm.

19th. No hæmorrhage, leg nearly healed; face resuming its ordinary appearance; right eye well, and vision restored; left eye better, and vision returning slightly.

20th. Hand contracting over wound, and he is doing very well in every respect; the conjunctiva of the left eye still hangs down, and will require an operation or removal.

21st. Doing well. Right hand will now be useful.

22nd. All hæmorrhage ceased; hand contracting over wound; left eye the same.

23rd. Doing very well; allowed up out of bed.

24th. Doing well.

26th. Same report; may now be called convalescent.

27th. Getting on rapidly towards convalescence.

29th. The hand continues improving, and is nearly filled up, the wound being about the size of sixpence in centre of palm. The hæmorrhage so constantly occurring was probably owing to the splinters of bone being present at the bottom of the wound. Lotion of carbolic acid, in proportion of 1 to 40 of water, now ordered to the hand.

A piece of the conjunctiva was removed from the left eye, as it was getting larger. Poppy fomentations ordered.

30th. The eye continues to get worse; the two conjunctivæ becoming apparently attached, and the cornea cloudy.

Sept. 7th. More conjunctiva removed, which was fringe-like, and sulphate of

copper had to be applied. Splints applied to right hand, to extend fingers. Continues quite well, excepting the left eye; more fringe-like growth of conjunctiva taken place, and had to be removed; cornea increasing in opacity.

25th. Eye less painful, but no better. Wine of opium applied frequently.

Oct. 3rd. Going on well, with the exception of eye.

8th. Doing well, excepting the eye.

15th. Same report.

20th. Complains of rheumatism in the shoulders. Hot baths ordered.

Nov. 2. Adhesions have formed between the ocular and palpebral conjunctiva. The cornea is ulcerated. Solution of atropine has been, however, tried with some success: he can distinguish light.

7th. Sent before a Medical Board, and passed unfit for further service.

10th. Cornea become to a great degree opaque.

12th. Same remarks.

17th. Eye is no better; the ulceration, however, at an end. Kept in hospital under the same treatment as regards the eye. Vin. opii, &c. Hand now a useful one.

Dec. 11th. Sent to his home, and an appointment has been given him in Woolwich Arsenal. About 120*l.* has been subscribed by the naval officers and the officers of 12th Brigade Royal Artillery, and a donation of 15*l.* from Her Majesty; giving to this man about 60*l.* He leaves the army in very good health.

2. Gunner C——, aged 38, of 17 years' service, an Irishman, was blown away from a 32-pounder, on July 1867, at Fort Blockhouse. On being brought immediately to hospital, he was found to have his left eye much burnt, the left arm much shattered, the left side much numbed, and the face cut and torn and blackened.

Treatment.—Arm amputated just below elbow; face and eye kept cool with glycerine and water; three vessels and a branch secured. 10 P.M.—Much oozing. I opened the stump, and examined it carefully, and ice was applied. Febrifuge mixture and an opiate given.

July 18th. Got a little sleep; no more oozing; eye the same; thirst complained of. Resume treatment, and a little brandy and water.

18th. Going on favourably; arm throbbing; dressings all retained. An aperient given, and water taken off by catheter; eye syringed.

19th. Same report. Ordinary diet, and a little brandy and water.

20th. Stump examined; water withdrawn by catheter; all going on tolerably well; eye syringed.

21st. Much discharge; all dressings removed. Oak-bark *decoction* to stump.

22nd. Matter forming in lids of eye; stump going on well.

23rd. Going on well; bandages had this morning to be loosened; discharge profuse. Strapping applied as the sutures are giving way.

24th. Going on well, but corner of stump bagging with matter, which is now pressed out regularly, and a pressure made on the part by compress and bandage.

26th. Going on well; ligatures and sutures coming away.

29th. Doing well: matter formed round eye.

Aug. 2nd. Some ligatures removed from stump.

4th. Doing well; one ligature remaining.

6th. Doing well; eye very painful. Fomentation.

8th. Eye painful; ligature holding; stump healing.

10th. Going on well; last ligature removed to-day; and eyelids lanced, letting out the matter.

12th. Doing very well indeed.

15th. Allowed up out of bed; stump nearly healed.

18th. Doing well.

23rd. Much improved.

26th. Stump all but healed, and he is walking about; eye well.

31st. Progressing favourably.

Sept. 10th. Same report; in fact, is now well, but is kept in hospital.

13th. There was a slight look of erysipelas of stump to-day. Caustic ring applied. Tinc. ferri sesq. given.

Sept. 21st. Quite well. Omit medicine.

Oct. 8th. Discharged to barracks. Passed, afterwards, a Medical Board. Artificial arm supplied, and 60*l.* subscribed for him.

Dec. 11. Discharged service.

A Case of Suicide by Pistol-shot Wound of Left Side. Remarkable Post-Mortem Appearances. Reported by Dr. White, R.A., Jhansie.

A POWERFULLY-BUILT healthy young man was admitted on the night of the 6th July, 1867, at about 6.30 o'clock, having attempted to commit suicide by shooting himself in the left side with a large pistol, loaded (as he himself states) with two stones as large as he could get into the muzzle of the pistol. There was a large wound on the left side, about four inches below and behind the nipple; one rib was bare for a considerable distance, and at each inspiration or expiration air came in and out of the wound as if the lung was largely injured. He was placed in a comfortable position and a large piece of lint steeped in oil placed over the wound, and over that a wide bandage extending the entire length of the thorax, and fastened tight so as to control as much as possible the thoracic respiration; there was very little external hæmorrhage, considering the extent of the wound, but he spat up some bloody sputa, and when I saw him he complained of wanting to expectorate, but of being unable, and of a feeling of weight on his chest, which induced me to believe that there was internal hæmorrhage; he got 40 minims of laudanum and was ordered to have 10 minims of the wine of opium every hour, with half an ounce of brandy. The wide bandage round the chest checked almost at once to a great extent the blowing sound in the wound.

This morning (the 7th) he is in a state of collapse, cold, blue, and almost pulseless, but still sensible; says he feels no pain; the blood has clotted and hardened on the bandage, and there is no blowing sound from the wound. In consultation it was agreed that in his present state it would be unwise to open the wound or meddle in any way; he was simply ordered half an ounce of brandy and ten minims of aromatic spirit of ammonia every hour. 6 P.M., collapse continues, so nothing was done; has passed no urine since being in hospital.

July 7. This morning the collapse has passed off; he is warm, his pulse fuller, and he says he feels pretty easy, but complains of the tightness of the bandage. All the bandages were cut, and the wound exposed; there was no air going in at the time; one rib was bare for four inches, and fractured just above the cartilage; the cartilages of two were cut clean as with a knife; in two places of small size a probe could be put into the chest, but no foreign body could be discovered, and even had it been discovered, it could not have been removed without making an opening by cutting a piece from the broken rib as all had closed down again, the wound was dressed with lint and oil, and chlorinated soda solution over this. He has made water twice since the collapse passed off, and taken nearly a pint of beef tea. 6 P.M., continues pretty well, his pulse not quite so strong as in the morning, but still very fair; is quite sensible, and says he feels no pain; has slept little; ordered to have a grain of morphia in solution at bed time.

July 8. Seems easy this morning; slept well, and says he feels no pain; his pulse weak; his breathing steadier; has made water and taken his nourishment; dressed the wound as before, and found it suppurating, but not freely; ordered to continue his beef tea and brandy, &c. 6 P.M. This evening he seems better, his pulse stronger, and his voice better; says he feels very easy; his bowels have been rather loose during the day; took his nourishment well; ordered to have a grain of morphia at bed time. Shortly after seven o'clock he got worse, and sunk gradually, and died at 11 P.M.

Post Mortem Appearances.

A large wound on left side, exposing the sixth, seventh, and eighth ribs and their cartilages and intercostal muscles for about four inches in length, the whole of the flesh having been blown clean away; the seventh rib was fractured close to the cartilage and was in small fragments. The cartilages between it and the sixth and eighth were cut clean through.

Heart.—Healthy.

Lungs.—Right healthy, slightly congested; left upper lobe healthy, and covered with freshly effused lymph; lower lobe very much inflamed, and filled with dark blood. A very small wound just opposite the broken rib, evidently caused by a splinter of the bone.

Abdomen.—When the abdomen was opened the whole of the organs were found bathed in an enormous quantity of semi-coagulated blood; this was found to have proceeded from a very extensive transverse rupture of the spleen, caused, it would appear, by the shock of the explosion of the pistol close to the side, as no stone, wadding, or any other foreign body was found either in the abdomen or thorax; the large intestine was inflamed, and its coats and vessels engorged with blood throughout its whole length; with this exception the other organs were healthy.

Case of Cut Throat, followed by Secondary Hæmorrhage, successfully treated by Deligation of the Common Carotid Artery. Reported by Assist.-Surgeon C. Spurway, 10th Brigade, Royal Artillery.

I was summoned, on the morning of the 5th August, 1867, to see Gunner P. C——, an old Indian artilleryman, but now of the 3rd Brigade, who had attempted suicide by cutting his throat.

He had been awarded a punishment by his Commanding Officer, and in a moment of anger he procured his razor, and, entering the latrine, committed the act. He was discovered just afterwards, and I saw him within five minutes. He was sitting on the latrine, with a stream of blood flowing from an extensive transverse wound in the anterior superior part of the throat, just beneath the chin.

The wound, made by the right hand, about five inches in length, was chiefly on the left side, and extended from the angle of the jaw to an inch to the right of the mesial line.

The incision, the deepest part of which was at the angle of the jaw, had completely divided the submaxillary gland, and had severed the facial and lingual vessels, besides inflicting some further injury to vessels deeper seated, as, when the flow of blood from the facial and lingual arteries was commanded by direct pressure, there was still a welling-up from the bottom of the wound, whose source could not be arrived at.

Seeing this, I commenced the operation for tying the common carotid, the hæmorrhage being restrained by plugging the wound. The first incision, three inches long, being completed at the point of selection, viz., below the omo-hyoid muscle, I proceeded to tie the external jugular vein, which was in the way, when Surgeon Park, Royal Artillery, arrived. Being thus assisted, I ceased the operation, for Mr. Park thought that tying the severed vessels would suffice, without resorting to the capital operation. The man being in a dark place on the floor, he was removed to an adjoining room, placed on a table in a good light, and the bleeding vessels (facial and lingual) were secured. This and the pressure applied to the bottom of the wound, seemed to have completely controlled the hæmorrhage; but so profuse had it been, that the man was much exhausted, his pulse being very small and weak; and the wound having been plugged with soft lint, he was removed to hospital. He was perfectly sober, quite free from any excitement, thoroughly sensible, and amenable to treatment. He was taken to hospital at about twelve o'clock, and strictly watched, with instructions against a recurrence of the bleeding.

At two o'clock the most profuse arterial hæmorrhage took place from the bottom of the wound, where the deep-seated hæmorrhage had been remarked. He was seen at once. He was much blanched; his surface was cold, with a pulse almost imperceptible—120 in frequency. The wound was closely examined, all the pledgets of lint being removed, and then the hæmorrhage recurred; but it was immediately commanded, by means of digital pressure. Here it was impossible to secure any bleeding vessel, from the depth of the wound, and the continual welling-up of the blood which obscured its source In this difficulty, there remained nothing but to complete the operation that had been commenced earlier in the day, as a further hæmorrhage would certainly prove fatal.

As above stated, the point of selection was below the omo-hyoid, but it had better have been above, for the operation was one of great difficulty, the man having a short, thick neck, and being very muscular. The vessel reached, a ligature was placed around it from without, inwards. It was then tied, and on withholding the pressure that had been applied during the operation, no further hæmorrhage occurred; two sutures brought the operation wound together, and iced-water dressing was applied to both wounds. He was put to bed, ordered some weak brandy and water, with some beef tea, and was carefully watched.

Vespere, 7 P.M.—Very quiet and comfortable; skin warm; pulse 108, of moderate volume; no oozing from the wounds; bowels not been moved for the last three days, to have a simple injection; takes what is given him well.

August 6th.—Has passed a very quiet night, but has not slept; no mental excitement is present; he is quite composed; pulse 108, of good volume; wounds looking well; no oozing. To omit brandy; to continue beef tea; bowels have been slightly moved.

Vespere, 6 P.M.—Has slept a little to-day; complains of pain in abdomen; ordered some castor oil and opium, and a sinapism.

August 7th.—Has slept very well, and feels very comfortable this morning; bowels have been well moved, and the pain is relieved; pulse 96, of good volume; wounds looking healthy; a slight inflammatory blush is present around the edges of the operation wound. To apply Condy's fluid lotion to the wounds.

August 13th.—Since last report he has gone on well; ligatures on external jugular came away to-day.

August 14th.—Ligatures on facial and lingual came away this morning; wounds looking very healthy; takes his food (entire diet) very well.

August 18th.—Ligatures on main vessel still firm; no traction to be applied to it. This is the 13th day since the operation.

August 22nd.—Ligature on carotid came away this morning; self-inflicted wound nearly healed; operation wound looking well. His general health is very good.

August 31st.—Embarked to-day for Canada, on board the ——; wounds quite healed; in good spirits and good health.

A Case of Compound Dislocation of Metatarso Phalangeal Articulation of Right Great Toe-Joint, treated by Excision. Reported by Surgeon W. R. Steuart.

Bombardier G. S., aged 26, 7 years service, healthy, and of strong muscular development, while at watering order, on 20th December, 1866, fell with his horse on frozen ground, and sustained a compound dislocation of the metatarso-phalangeal articulation of the right great toe-joint. On admission into hospital, half an hour after the accident, the phalanx was found to be displaced inwards, and rested on the attachment of the first interosseous muscle, close to the head of second metatarsal bone, the head of the first metatarsal bone being extended through a lacerated wound, about an inch in extent, on its inner cutaneous and adjacent surface. The ankle-joint was much swollen, and considerable deep-seated extravasation of blood had taken place in the vicinity, rendering complete examination of the joint difficult, but no bony lesion could be made out. The pain and suffering were more marked than the circumstances of the case seemed to justify. Chloroform having been administered, several ineffectual attempts were made to reduce the dislocation without avail; and although, from the anatomical character of the displacement, much hope could not be entertained of such reduction, it was worthy of trial. I then proposed, as the most effectual means of obtaining apposition, to excise the head of the metatarsal bone in preference to the division of tendons. The wound was enlarged by an incision parallel with the inner edge of the first metatarsal bone, to the extent of two inches, the head and neck of bone being everted from surrounding textures. The former was removed by a fine saw. The phalanx was then replaced without difficulty, complete adjustment of the ends of the bone being the result. Bleeding having ceased, three wire sutures were inserted, allowing space for purulent discharge. The man was then placed in bed, and his leg suspended in a swinging cradle, the wound being covered with lint soaked in cold water, and renewed every half hour; ankle fomented with

arnica and lead lotion. The case progressed most satisfactorily, the wound granulating favourably from the date of operation, and becoming completely healed on the 26th day after excision. The man is now walking about the ward, possessing considerable power of flexion and extension of the joint. He is at present assisted by crutches, but every day gives hopes of his being enabled to dispense with their use at an early period.

Remarking on this case, we find allusions to those of a similar description by Miller, who states that compressed dislocations of the phalanges require amputation. Fergusson passes over them with little notice, but records mention of excision of this joint by Professor Pancoast and Regnoli of Pisa for carious disease. The close attachment of the tendons in the neighbourhood of this articulation, and the existence of two sesamoid bones, render the reduction of any dislocation of this phalanx outwards impossible *without* operative interference. If it be remembered that we have *anteriorly* the expansion of the tendons of extensor brevis digitorum, and extensor longus pollicis, the former being inserted into the first phalanx, *posteriorly* the flexor brevis, flexor longus pollicis and transversus—leaving the adductor and abductor, with the plantar and two lateral ligaments, out of the question—it is plain that these opposing forces are much assisted by the mechanical obstruction caused by the sesamoid bone, continued in the inner tendon of the flexor brevis pollicis, which must become interposed between the displaced end of the phalanx and the head of the first metatarsal bone, when such a dislocation takes place.

Now, regarding the division of the tendons of these muscles to effect reduction, it may be stated, first, that the greatest possible amount of extension, and attempts at coaptation under chloroform, were made to secure the desired object, but notwithstanding no appreciable approximation of the ends of the bones was made; secondly, during the progress of the extension, no tension of tendons was observable. Therefore the reduction was without doubt impeded by the impaction of the inner sesamoid bone; and such being the case, tenotomy was clearly contra-indicated.

Taking then the whole circumstances into consideration, excision of the head of the bone seemed the only proper remedy; and I am happy to be able to record so satisfactory a result from this plan of treatment.

A Case of Poplitial Aneurism, treated by pressure, combined with Ether Spray applied to the Tumor. Clonmel, February, 1868. *Reported by Assistant-Surgeon H. Harrison, R.A.*

Driver G—— B——, aged 27 years, 9 years driver, all at home. His appearance is healthy, but his medical history shows that he has frequently been in hospital, and suffered from primary and secondary syphilis, and continued and intermittent fever. Was admitted on the 12th of January, 1868, complaining of pain in his leg from his ham downwards, both back and front, and that he was sometimes obliged to cease when walking from a sudden pain in the left ham. On examination a tumor as large as a small orange was found in the poplitial space, with the characteristic pulsation of aneurism, a slight bruit audible. Pressure of the femoral artery in any part of its course so as to stop the passage of blood through it, caused the pulsation to cease, as also does extreme flexion of the leg upon the thigh. He says that during the latter end of the drill season of 1867, when riding a rough horse, he felt something give way in his ham, and that it has gradually got into the state above described. Two other medical gentlemen having seen the case, considered with myself that it was a good one for pressure, and an instrument (Read's compressor) was applied for from Dublin.

The compressor, a stiff one, commonly called Carte's, was applied on the 19th January, about 4 inches below Poupart's ligament, the part having been shaved previously. The pressure was commenced at 10 A.M, but could not be borne by the patient, and the instrument was taken off at 11.15 A.M., and replaced by the manual pressure of three intelligent gunners. The pressure was well kept up so as to stop all pulsation of the tumor, and a jet of ether spray was directed against it for about 20 minutes, at 3 P.M., and the tumor became solid during its use, and did not pulsate on removing the pressure. The pressure, however, was continued, but at 6 P.M. and 9 P.M. it was found

that there was pulsation, but much feebler. The same existed next morning, and at 3 P.M., on the 20th January, digital pressure was discontinued. The effect of the application of the spray, together with the pressure, was evident 20 minutes after its use, the tumor being solidified. The tumor remained for some days more solid, and with feebler pulsation in it than before the treatment was commenced, but gradually returned to its former condition. A supply of ether and Read's most recent compressor had in the mean time been written for to Dublin.

The instrument was applied at 3 P.M. on the 29th January, compressing the artery just above Poupart's ligament, and alternated carefully with the stiff instrument before in use, and the ether spray sufficient to freeze the surface of the tumor every half hour. There was not the slightest pulsation on removing the pressure at 4 P.M.; it was kept up for 26 hours—viz., until 6 P.M. on the 30th, no pulsation having been detected for 25 hours. There was no distress or constitutional disturbance, and the tumor is hard and small like a racket ball, and without pulsation. He was directed to maintain the limb in a semi-flexed position for some days, and to keep as quiet as possible. On examining the case on the 15th of February, the aneurism was considered completely cured, and the collateral circulation established. The limb is in every respect equal to the other, and the tumor has been reduced from the size of a small orange to that of a walnut, and is quite hard, so that the case may be looked upon as successful. A great measure of the rapid solidification of the aneurism may fairly be attributed to the application of the ether spray, as it occurred equally quickly on both occasions it was used. Its success on the last attempt was due to its being combined with the very excellent pressure of Mr. Read's (of Dublin) new instrument.

A Case of Aneurism of Popliteal Artery (right side); failure of Treatment by compression; Deligation of Femoral, followed by suppuration of the Toe and Hæmorrhage from the distal end of the Popliteal vessel, necessitating Amputation of the Thigh. Reported by Staff Assistant-Surgeon M'Nalty.

Gunner William Scott, Coast Brigade, Royal Artillery, about 36, 18 years service, was admitted into Royal Artillery Military Hospital, Stoke, Devonport, on 23th October, 1867.

Previous History.—Generally enjoyed excellent health till four days before admission, when he felt some uneasiness in the popliteal space of right side, ascribed to a tight garter; on the 20th October, being employed as a letter-carrier, he had to walk a distance of eight miles, and on the following day feeling a small swelling in the knee, he applied for advice.

State on Admission.—A tall, well-nourished, healthy looking man; there is a tumor, very expansile, and the size of a hen's egg, in the popliteal space; pulsation is arrested by pressure on the femoral artery; heart sounds normal.

Treatment.—The patient whose co-operation was induced by explaining to him the nature of the disease and rationale of the means to be adopted for its cure, was placed in a quiet ward, and continuous digital pressure exerted on the femoral artery as it passes over the rim of the pelvis, by relays of attendants, each controlling the circulation for a space of ten minutes, and then relieved, three men being thus employed for two hours at a time, and nine men altogether told off for this duty.

Low diet ordered and sedatives to relieve pain. This treatment was continued for upwards of 48 hours without any marked good result; then a Signorin's tourniquet was applied, and subsequently a modifier Carte's compressor. The patient became very restless, irritable, and, indeed, unmanageable, taking every opportunity to unscrew the compresser when unobserved.

November 13. Flexion of the knee-joint after Mr. Ernest Hart's method resorted to.

November 17. Tumor just as large, and pulsation quite as forcible as when first admitted.

November 18. There is evident thinning of the external wall of the aneurism, and on one spot a small blister has formed since yesterday over the tumor; under these circumstances the femoral was ligatured without delay at

apex of Scarpa's triangle, care being taken to secure the vessel as far away as possible from the origin of the profunda femoris, and to make only a small opening in the sheath. The artery was found apparently healthy; the lips of the wound were brought together by interrupted silver suture, and lint moistened with a dilute solution of carbolic acid applied, and the limb enveloped in cotton wadding secured by a flannel roller; he progressed very favourably; the temperature of the limb, which was rather low at first, rose in a few hours; the tumor became small and firm, and he merely complained of the usual aching pains from the enlarging anastomosing vessels.

November 21. A superficial adherent ash-coloured slough, the size of a shilling, and accompanied by a pricking sensation in the part, has made its appearance over the tumor; pulse 76.

November 28. Wound in Scarpa's space suppurating in central third; pulse 100, tongue coated with whitish fur, hot dry skin, thirst, and highly coloured urine.

To have a diaphoretic every third hour.

December 1. Pulse 80, wound healthy, slough in popliteal space separating; temperature of limb 0·4° higher than its fellow, a nutritious but unstimulating diet allowed.

December 4. Patient feverish, restless, and irritable; complains of much pain in knee and popliteal space; there is tenderness and swelling in lower and inner aspect of thigh.

Wound in Scarpa's triangle healed, with exception of a small opening where the ligature lies.

Muriate of morphia in quarter and half grain doses to relieve pain and prevent sleep.

December 6. The sac has suppurated, and the thin external wall yielding to-day gave exit to a large quantity of brick-coloured grumous matter, consisting of broken-down blood, clot, and pus; this occurrence was followed by relief.

Sac treated as an ordinary abscess; charcoal and subsequently solution of carbolic acid being used to correct fœtor.

December 8. Passed a sleepless night, pulse 92, discharge profuse, and exhaling a peculiar sickly odour; the surrounding parts are very painful and tender.

Morphia continued.

December 10. 5.30 P.M., while using the bed-pan, as was anticipated from the low destructive character of the inflammation in and around the sac, alarming hæmorrhage occurred from the distal end of the popliteal artery; it was promptly arrested by the medical officer on duty, and in consultation with Surgeon Rudge and Dr. Crowe, R.A., it was deemed expedient to amputate at the middle third of the thigh for the following reasons:—

1. The vessel was evidently so much diseased that it would be futile to attempt to arrest permanently the hæmorrhage by pressure or any other means.

2. The inflammation in the surrounding structures had never any tendency to be limited, nor was there the slightest attempt at repair, indeed the sloughing sac might be looked upon as a local gangrene.

3. The integrity of the knee-joint was latterly a matter of great doubt.

4. The man was becoming worn out from the profuse discharge and pains.

The patient being chloroformed, amputation was performed in the usual manner by antero-posterior flaps; a large number of vessels had to be severed; there was a considerable quantity of venous, hardly any arterial, hæmorrhage; the flaps were well sluiced with cold water, and care having been taken to secure every bleeding branch, they were brought together with silver suture, a piece of lint moistened with cold water placed over the wound, and support afforded by a calico roller.

He suffered so severely from "shock" that it was with great difficulty that reaction could be established by suitable means; the pulse continued for some hours exceedingly rapid, shallow, and not easily counted; traumatic delirium of the nervous or irritative type supervened, with great irritability of stomach, and distressing hiccough came on; quarter grain doses of hydrochlorate of

morphia were given every three hours, and alcoholic stimulation in the shape of brandy and gin, and liquid nourishment consisting of beef tea and chicken juice in small quantities often repeated.

December 11. 10 o'clock A.M. (16 hours after operation), pulse 106, decreased in rapidity, increased in volume, countenance anxious, delirium less.

Ice to suck to relieve irritibility of stomach, which, though less, still continues. A little sulphuric ether combined with each dose of the morphia.

Vespere. Delirium abating.

Dec. 12. Afternoon, pulse 96, stomach retaining nourishment, stump placed in a position to allow serous oozing to drain away, and dilute solution of carbolic acid applied.

Dec. 13. Pulse 80, skin cool and moist, tongue clean; inner halves of flaps suppurating.

Dec. 16. Profuse discharge from flaps chiefly from inner side, where the ligatures lie. Pulse 92; patient looks anxious and worn; strength supported by free uses of stimulants, and easily assimilated liquid nourishment; nitro-hydrochloric acid with quinine ordered, and morphia at bed time to procure sleep.

Dec. 18. Ligature came away from femoral artery where it was tied in Scarpa's triangle, and with it some deep seated pus; cicatrix looks inflamed.

Dec. 19. The incompletely organized tissue of the cicatrix, not being able to withstand the irritation caused by separation of the ligature, has suppurated throughout nearly its entire extent, and there is an erysipelatous blush round it; oozing of deep-seated pus still continues.

Fifteen minims of tincture of the perchlorate of iron to be taken every four hours.

Dec. 21. Marked improvement, pulse 80; wound in Scarpa's space granulating satisfactorily, while the surrounding inflammation is localized and subsiding; flaps healthy.

Dec. 23. Outer halves of flaps firmly united, except at extreme edges; last two ligatures have come away from the stump.

January, 25, 1868. Since last report the case did well, both wounds soon healed, with the exception, near inner edge of cicatrix of flaps, of a small fistulous opening. The man's general health is very good, and he has quite lost the anxious appearance he had three weeks ago.

Staff Assistant-Surgeon Kelsall kindly dissected out the aneurism from the limb, 18 hours after amputation. The following pathological conditions were observed:—

For a distance of five inches upwards from the angle of flexure of the knee-joint, and in the posterior aspect of thigh, the parts surrounding the tumor were much softened and undermined, breaking down readily under pressure of the finger, and infiltrated with fluid, chiefly blood; the superficial or posterior wall of the sac was either wanting or exceedingly thin, while the deeper or anterior one corresponding to lower end of femur, and posterior ligament of Winslowe was much thickened; the knee-joint contained a large quantity of greenish, yellow viscid fluid containing floating flakes of lymph.

The chief points of interest in the case appear to be the infrequency in popliteal aneurism of the complication which arose; the lengthened period, 31 days, before separation of the ligature from the femoral artery. A large quantity of blood was lost in a short space of time from the distal end of the popliteal; the marked good results following the use of the perchloride of iron in checking erysipelatous inflammation. The fact of amputation being performed 3¼ inches below the point where the femoral was ligatured; this procedure was justified, I think, when it is taken into consideration how much risk in amputation of thigh is increased as the trunk is approached, and there was every reason to believe that there would be sufficient collateral circulation for the nutrition of the flaps, indeed, according to recent views and practice, the previous ligature of the main artery of the limb may have favourably influenced the wound inflicted by the amputating knife.

The patient was of a highly nervous temperament and very irritable constitution, unable to bear pain, and at times was very unmanageable. The slightest disturbing force seemed at once to light up inflammatory action in his system.

Case of Aortic Aneurism, well marked during Life. Reported by Surgeon Ovens, 5th Dragoon Guards.

Serjeant J. D., of the 5th Dragoon Guards, was sent to me for the purpose of being medically examined previous to re-engagement at the beginning of last September.

I found him a strong muscular man, 5 feet 10 inches in height, 10 years' service, all of which was at home. I found he had the character of being a steady, temperate man, who had been once in hospital, soon after joining, with syphilis, for which he was under treatment nearly a month. This, with the exception of an attack of diarrhœa, in 1861, was the only occasion on which he came under medical treatment during his service. No mercury was administered for the syphilis, and it was not followed by any constitutional symptoms.

On examining his chest with the stethoscope, I discovered a well marked systolic bellows sound, audible along the entire course of the ascending aorta, but which seemed to increase in intensity the nearer the stethescope was placed to the heart; there were also well marked evidences of enlargement of this organ.

With these exceptions the man seemed in perfect health and condition, and had no symptoms whatever, either of disordered circulation or respiration. Greatly to his disgust and apparent astonishment, however, I refused to pass him, advising him to be very careful in his manner of living, &c., and recommended him to come to hospital and get invalided, but he insisted he was quite well, said he could do his duty, and wished to continue doing it.

On the morning of the 6th December, I was called suddenly to see him, he having, the messenger said, "fallen down in a fit." I found that he had, when standing in the barrack square, suddenly complained of weakness, and then fallen down apparently lifeless.

On my way to the case, I quite made up my mind that the aneurism had burst. He was immediately conveyed to hospital, where restoratives in the shape of ammonia were administered, and warmth applied to the extremities. At this time his lips were blue, his extremities cold, and the pulse could scarcely be felt. Somewhat to my surprise, reaction rapidly set in, and half-an-hour after admission he was quite himself again, and stuck to his former story of being quite well.

I saw him several times during the day, when he seemed quite easy, but the auscultatory sounds were the same, and I expressed my opinion to the Staff-Surgeon, whom I requested to see the case with me, that an aneurism existed at the entrance of the aorta.

In the evening he was ordered a dose of castor oil with a sedative, his bowels not having been open for some days.

At 8·30 A.M. next day, after eating a hearty breakfast, he suddenly fell back on the pillow, and expired almost instantaneously.

The following were the *post-mortem* appearances:—

On opening the thorax, I found it quite free from effused blood; the lungs were everywhere remarkably healthy, and were not adherent. The bag of the pericardium was, however, enormously distended, and on opening it I found this was caused by a mass of coagulated blood of a firm consistence. Some old adhesions seemed to exist between the heart and pericardium, the former was a good deal enlarged, weighing 1¼ lbs.; the source of the blood was found to be from a ruptured aneurismal pouch, so near the root of the aorta as to project within the pericardium. The valves were healthy, the coats of the left ventricle thickened, the interior of the aorta small and of a uniform yellowish-white colour; on its anterior and inner side was a hole, through which the little finger could be pushed, communicating with the before-mentioned pouch, the valves of which in some places were as thin as a wafer. The liver somewhat abnormally large, but the rest of the body healthy.

This case is one, I think, of peculiar interest. One of our greatest physicians and most instructive writers has said, "When aneurismal pouches

form, as they often do, at the very entrance of the aorta or coronary arteries, they often defy detection. I, at least, know of no sign of their existence upon which a physician can rely which can lead him even to suspect such a state of matters; but all at once the patient drops down dead, and upon searching for the cause of this sudden extinction of life, you find the pericardium distended with blood, and the source of that blood you find to be the ruptured aneurismal pouch so near the root of the aorta as to project within the pericardium."

It is worthy of attention, too, the total absence of all constitutional symptoms of aneurism. As I before mentioned, there was no symptom either of disordered respiration or circulation. The man had no expression of anxiety, but on the contrary looked strong and healthy, and stoutly maintained too that he was fit for any duty a soldier could be called on to perform, so that there was nothing either in the case or its history to in any way aid auscultatory sounds in forming a diagnosis.

It is valuable too as proving the necessity for examining men with the stethoscope before medically passing either recruits or re-engaging men.

Two Cases of Larvæ in the Human Nostril. Reported by Dr. W. Quinton, R.A.

1. Mrs. F., aged 30, wife of a private soldier, 93rd Regiment, Sutherland Highlanders, complained at Seepree, on the morning of 1st October, 1867, of intense pain of left brow and left side of nose, and said blood had been dropping from the left nostril all the previous night. These symptoms lasted till night of 2nd instant, when a larva was brought to me which had crept out of the left nostril, from one-half to three-fourths of an inch long, yellowish white, transparent, annulated, tapering at one end, with two minute black feelers, bulging at the other with a black speck at the extremity, and a black streak extending from the latter through centre of body, for about one-fourth of total length. In the act of progression, the tapering end in this and all the larvæ subsequently seen was always anterior.

On the 3rd, as many as one hundred of these creatures were removed from the nostril by forceps, or escaped from it spontaneously. The face was much swollen; left eye quite closed; dropping of blood continued. On the 4th the swelling increased; pain continued, with much irritative fever; smell from nostril very foul.

Injection of solution of chlorinated soda twice daily; tepid water injections frequently; chlorate of potash internally.

The woman states that within the past month, on two or three occasions, some of these "worms" were seen on the sheets of her bed; has no recollection of any insect ever having entered her nose, but has had intense itchiness of the affected nostril for a month; there was no decided pain till the 31st ult.

Oct. 5.—No larvæ came away yesterday or last night; had an opiate, and slept fairly; nose red, and very painful; smell from nostril most offensive; face continues much swollen.

Plug left nostril posteriorly, and use creosote injections twice daily; tepid water injections frequently; continues chlorate of potash; low milk diet; four ounces of port wine.

Oct. 6.—Twelve larvæ escaped yesterday; one last night; had opiate, but rest has been uneasy; bleeding has ceased; smell continues very offensive; small hole, through which a probe passes, discovered in septum narium, near the tip of nose.

Plug removed from nostril yesterday, after the second injection of creosote. Apply now oil of turpentine locally, by piece of cotton wool on stick; injections of solution of Condy's fluid twice daily; tepid water injections frequently. Chicken diet; four ounces of port wine; two eggs.

Oct. 7.—Five larvæ came away spontaneously in forenoon; one in afternoon of yesterday; none during last night. Swelling of eyelids quite gone; upper lip still much swollen; smell continues very offensive; no pain; no irritative fever; is very weak.

Oil of turpentine locally as yesterday; continue injections of solution of

Condy's fluid and tepid water; chlorate of potash in decoction of bark internally.

Oct. 13.—On the 8th was removed into a tent (with side walls up during day), owing to continuance of offensive smell. From afternoon of 6th inst. up till yesterday at 2 P.M. no larvæ escaped; two came away at that hour; none since. Has been improving in health; swelling of face has subsided; smell less offensive, but not quite gone.

Since the 8th inst. local treatment has consisted in the injections of tepid water, and of weak solutions of Condy's fluid with glycerine. Re-apply oil of turpentine to-day. Continue chlorate of potash in decoction of bark; continue injections as before. Chicken diet; three ounces of port wine; two eggs.

Oct. 28.—Since date of last report has been under constant observation. There has been no appearance of any more larvæ; some pain lingers in left side of nose superiorly; the anterior cartilage has lost its hold on the nasal bones, and has receded slightly; there is a want of firmness to the touch in left nasal bone, as if it were diseased; slight purulent discharge occasionally, foul-smelling; surface of nostril internally healthy, as far as the eye can see; health good.

Local treatment has consisted, since last report, in tepid water injections, with glycerine. Generous diet.

Oct. 31.—Case transferred to the Officer in medical charge of 93rd Regiment, Sutherland Highlanders.

2. *Oct.* 17, 1867.—Chand Khan, Hindoo, aged 30, a camel-driver, presented himself at the native dispensary of Seepree yesterday, in forenoon, complaining of intense pain in right eyebrow and right side of nose. Blood had been dropping from right nostril all previous night, and in the morning a larva escaped in all respects similar to that described in Case No. 1. Seventeen or eighteen of these creatures came away subsequently, during day and night. There is great pain this morning; face is much swollen on right side; dropping of blood from nostril continues.

The man states that six days ago he was loading his camel with wool, when a green fly entered his right nostril, to expel it from which all his efforts failed. Itchiness and uneasiness in nose continued till 15th inst., when the bleeding and pain commenced.

Oct. 18.—Fifteen larvæ escaped yesterday and during last night, all of the same kind; eleven of them came away immediately after an injection of oil of turpentine. There is much pain; dropping of blood continues; very foul smell from nostril.

Oct. 19.—Twenty-three larvæ escaped yesterday and through night; majority came away after injection of oil of turpentine. Pain and bleeding less; foul smell continues.

Oct. 28.—Twenty-six larvæ yesterday and through night; bleeding quite ceased; pain less; smell continues foul.

Oct. 28.—Eight larvæ have escaped since last report; none for the past three days. There is slight soreness in nostril, and some offensive smell from it; all swelling of the face has subsided, and both bones and cartilages are firm and natural to the touch.

Oct. 31.—Have lost sight of the man; has gone with his camels to a distant station.

The local treatment in this case has been the same as that employed in Case No. 1.

A case of Yellow Fever treated with Sulphuric Acid Bath. Recovery. Reported by Deputy Inspector-General Dr. Grant, Bermuda.

GUNNER G. C., Royal Artillery, was admitted into hospital on the 12th October, suffering from high fever which came on suddenly, and was attended by pain in the epigastrium and back, and frontal headache. Having been in attendance upon two patients affected with yellow fever, his case was watched with some anxiety. He had a full dose of castor oil, and was placed immediately in a hot bath containing 2 drachms of strong sulphuric acid to each gallon of water. He was kept in the bath about quarter of an hour, when he was wrapped in blankets and put to bed, after which the chest and abdomen

were kept fomented, and the extremities sponged with the same acid solution. Under this treatment the febrile symptoms abated, and in 10 days he had so far recovered that I intended soon to discharge him from hospital.

On the 23rd October, however, he had a sudden accession of all his symptoms much more severely than before. At my morning visit he seemed to be doing well, but he felt unwell about the middle of the day, was disinclined for his dinner, and lay down. This change was not reported to me immediately, but at my evening visit, about 6 o'clock P.M, I found him in a high fever. Pulse 126, full and bounding; skin burning hot, so much so that the hand was almost involuntarily withdrawn from it. Great and distressing frontal headache; much pain over the epigastrium, but no vomiting. Eyes suffused, and much conjunctival congestion. Tongue dry, and loaded with a thick white fur. He was immediately placed in a hot bath, prepared as before, in which he remained from ten minutes to a quarter of an hour, when he was wrapped in blankets and put to bed. After the bath fomentations of the same acid solution to the chest and abdomen, and sponging of the extremities also with the acid solution were assiduously employed. A profuse diaphoresis followed the use of the bath, and lasted two or three hours.

Oct. 24th.—Considerably better. Pulse 96, and much softer; skin moist; tongue not so dry, but still covered with a white fur. To have an ounce of castor oil, and drink as freely as he can barley water and then arrowroot.

Vespere. Is better. Skin moist; tongue coated as before, but not so dry; pulse 90, full, but soft. Has had two copious feculent evacuations of natural consistence and colour. Pain in stomach nearly gone, but the frontal headache still very distressing. Continue the acid fomentation and diluents.

25th. Pulse 80 and soft; tongue coated with white fur, and rather dry; skin hot and harsh, but not so burning as before. Has been purged eight or nine times. The evacuations had been removed before my visit, but the attendant describes them as having been feculent, very dark, but without any sign of blood. Continue the diluents, and acid fomentation and sponging.

Vespere.—Has been purged once since morning. Evacuation thin, dark, very bilious, but not bloody. The attendant says that those of the morning were the same. Complains of wind in the stomach. Pulse 88, and soft; tongue moist, still covered with a white fur; skin rather hot and dry; pain in forehead less, and not so constant; no pain in epigastrium. Continued the acid fomentation and diluents, and an ounce of peppermint water when required.

26th. Less fever; tongue moist, and clearing at the edges; pulse 76, and of moderate fulness; pain in forehead nearly gone, but recurs at intervals. Complains of aching in the back and limbs, when he remains more than about 10 minutes in one posture. Bowels were once opened during the night. Evacuation moderately copious, dark, and very bilious. Continue the acid fomentation and sponging.

Vespere.—Not so well. Pulse 76, and fuller; skin hot and dry; tongue still covered with a creamy fur. Complains of severe pain in the bowels which have not been moved since morning. To have twenty drops of solution of acetate of morphia in an ounce of peppermint water when necessary. Fomentations of hot water were applied, and the acid mixture discontinued under the apprehension that its too free absorption might have caused the pain, but a very little reflection satisfied me that this was not the case, and it was resumed and applied as hot as it could be wrung out of flannel, so as to answer the ordinary purpose of a fomentation. To have 2 ozs. of brandy mixed with 4 ozs. of water in small quantities during the night.

27th. (3 o'clock A.M.) I have just been called to see him as he had a great deal of pain in the stomach during the night, which is now very severe, and he complains of a sense of fulness and distension of the stomach. Bowels have not been opened, but he has vomited about 4 ozs. of dark bilious matter *nearly black*, and has had some bleeding from the nose. Complains much of severe pain in the forehead, shooting through the temples. He has never been quite free from this frontal headache, but it has been less constant. Pulse 72, and weak; tongue dry, white in the centre, and red at the tip and edges. Has made no water for 24 hours. Feet and legs cold; stomach irritable, and he is very weak and low. 4 A.M. Has vomited again about 4 ozs. of a light ash-grey coloured viscid

fluid slightly streaked with blood, and containing magnesia lately administered. I am uncertain whether this and the matter vomited an hour ago are to be considered black vomit, but they are very suspicious. His breath is very fetid and his stomach irritable. To have a scruple of carbonate of magnesia. Bottles of hot water to the feet and legs, and the acid mixture as hot as it can be borne as a fomentation over the abdomen. To take 20 drops of solution of acetate of morphia. Continue the topical application.

11 A.M.—Is very easy and quiet at present. He passed about a pint of urine half an hour ago which is of a deep yellow colour, and gives a decided precipitate with nitric acid. The urine has been of natural appearance and quantity, and has not been minutely examined before to-day. Bowels have not been moved, nor has there been any vomiting since last report; but the stomach is still irritable. He is extremely weak and the prognosis is very unfavourable.

To have about two table spoonfuls of beef-tea, and the same quantity of a mixture of one part of Hollands to two parts of water every alternate half-hour, and to drink barley-water as freely as the stomach will bear. Continue the acid fomentation tepid as before.

Vespere.—Very weak. Pulse 74, and small. Has no urgent symptom. Took about half-a-pint of beef-tea in spoonfuls during the day. Could not take more as it made him sick. Continue the beef-tea and gin, as he can take them during the night. Continue the acid fomentations tepid.

28th.—Vomited about 3 ozs. of pure bile at 1 o'clock this morning. Very weak. Pulse 62, and feeble. Cannot take much beef-tea as it makes him sick. Has made no water since yesterday forenoon, but the bladder is distended. Free from pain in the head and epigastrium. Tongue cleaner; white fur is nearly gone, but it looks rather raw and glazed at the edges and tip. About a pint and a half of dark urine loaded with bile, and very albuminous, was drawn off, causing much exhaustion. Tongue red and raw looking.

3 o'clock P.M.—Very weak, and unable to take sufficient nourishment by the mouth. Had an enema, consisting of half a pint of beef-tea and an ounce of brandy at noon, and the result is most satisfactory. Pulse 64, much increased in volume, and he feels stronger.

Vespere.—Very weary; pulse 68, of moderate fulness; tongue much cleaner, and moist. Has made no water since the morning: the catheter was passed, but no urine flowed. Is tolerably free from pain.

Has had another enema the same as last, and it will be repeated at bedtime, and once during the night. To drink as much barley-water as he can, and continue the acid fomentation. To have 20 drops of solution of acetate of morphia.

Oct. 29th.—Slept well, and feels refreshed. Passed a pint and a half of urine at 1 o'clock A.M., which was high-coloured, bilious, and much mixed with blood. The presence of so much blood may have been caused by a slight abrasion in passing the catheter, which was grasped by a strong spasm along the whole course of the urethra; but it indicates a very vascular state of the mucous membrane, because the absence of pain either in the urethra or bladder shows that no injury has been inflicted. No pain in head or epigastrium, and is free from nausea. He retched a little after passing water, and was very faint; indeed he is so weak that a feeling of faintness is induced even by the exertion of turning himself in bed. Drank about a pint and a-half of beef-tea during the night, and retained the enemata.

Continued the acid fomentation. Not to take more than a pint of beef-tea, by spoonfuls, during the day, and to have two pints of beef-tea and 4 ozs. of brandy, by the rectum, in the course of 24 hours. To drink as much barley-water as he can. Continue the gin. Has taken 6 ozs. of gin daily as a diuretic and stimulant since the 27th, when urine was suppressed.

Vespere.—Has passed nearly a pint of very dark bilious urine, very albuminous, and loaded with a light flocculent sediment, which is suspended in it; pulse 60, and weak; tongue clean, and he is free from headache and pain, or irritability of stomach; feels quite easy; retained the beef tea enemata.

Continue injections of beef tea and brandy, and the acid fomentation and diluent during the night.

30th.—Febrile symptoms abated, but he is alarmingly weak, and has frequent fits of syncope, which last from five to ten minutes, and are followed by

somnolescence; pulse 64, and very feeble; skin cool; tongue red and dry. There is a good deal of passive hæmorrhage from the gums, which are swollen and spongy. This sign was present two days ago, but it was not noted, as he attributed it to a bad tooth. Has passed a pint of urine during the night, which is high-coloured, albuminous, and smells very strongly of urea. It looks clear in the pot, but shows, in a glass vial, a turbid sediment, mixed with small membranous scales, which are probably epithelium and tube casts. Has retained all his nourishment.

Continue the acid fomentation and the nourishment. To have 10 ozs. of brandy by the mouth, and in enemata during the day. He is tired of the gin, which makes him sick, and is no longer required as a diuretic.

11·30 A.M.—Has just passed nearly a pint of urine of the same character, and containing a large quantity of urea. This free secretion of the urine, and elimination of urea from the system, are very favourable signs.

Vespere.—Has passed nearly two pints of urine of the same character since last report; pulse 56, but of full volume.

Continue the beef tea and brandy enemata, and the diluent during the night; also the acid fomentation.

31st.—A very decided improvement; he is stronger, and has face has a bright, cheerful expression; but he had two fainting fits during the night, each of which lasted about five minutes. Tongue clean and moist; pulse 60, small and feeble; passed upwards of two pints of urine during the night, which is of a natural straw-colour, but smells strongly of urea, and contains a good deal of light, suspended sediment, and albumen. The bowels have been moved once during the night; evacuation not copious, watery and light-coloured; the gums are spongy, and bleed on the slightest touch, and he is much annoyed by a crop of painful boils on his left shoulder and elbow. Passed a quiet night, and slept well. Continue the acid fomentation, stimulants, and nutritive enemata.

Nov. 1st.—Doing well; urine copious, of the character last described; no passage from the bowels; tongue clean and moist; skin cool and soft. He had the same feeling of faintness last night, which lasted only a few minutes. The urine still contains a little albumen and sediment; the secretions are now restored, and the fever has quite left him; extreme debility is now all that remains to be contended with.

Omit the acid fomentation, and continue to nourish and stimulate as before.

From this date the record is one of slow but progressive improvement; he had no return of syncope, and gradually gained strength. On the 2nd November he was carefully moved on to another bed, furnished with sheets and clean bedding throughout. On the 5th the nutritive enemata were discontinued, and nourishment administered only by the mouth. No solid food allowed. On the 7th he had a light custard pudding for dinner, and occasionally, from that time, a soft-boiled egg, with dry toast, as his stomach could bear it. On the 19th November I transferred him, as a convalescent, to another Medical Officer. For the last two days his nourishment has been an egg at breakfast and tea; a rice pudding for dinner, with half a pint of beef tea at bed-time, and when he first wakes in the morning. I have not ventured to give him meat yet, as there is still a little soreness of the gums.

The Insomnia and Delirium of Pneumonia, Treated by Digitalis, with Remarks on an Illustrative Case. By Surgeon W. R. Steuart.

Considerable difference of opinion has always existed as to the physiological action of digitalis, but it is only within the last three years that the practical value of this plant, in certain derangements of the nervous system, has brought to light its great usefulness in the treatment of such affections. Dr. Hood, of Philadelphia, in his treatise on therapeutics (1860), states that the exhibition of digitalis is hazardous near the close of exhausting diseases, and that its use in delirium tremens is of more than doubtful propriety, but mentions that it may be advantageous sometimes in acute mania, and that it has been recommended in pneumonia (first stage?) to bring the system promptly under its depressing influence. Dr. Mayo, President College of Physicians,

represents it to be the most valuable nervine sedative we possess, whilst opium is the least so—an opinion endorsed by Dr. Robertson, of the Sussex Lunatic Asylum, who considers it quite specific in controlling the maniacal excitement of the insane. And several eminent physicians acknowledge its use, as a tonic to the organic muscular system generally, its action on the uterus not being the least of its effects. The experiments of Traube, of Berlin, before and after the division of the par vagum, are confirmatory of such opinion by showing its influence to be directly on the organic nervous centres. The publication of numerous cases of delirium tremens shows its value in promoting sleep in this disease by its exhibition in large doses, inducing recovery, and from the satisfactory results of its employment, there can exist no doubt as to its effects being produced by sedative action on these organic centres. I now subjoin a case of pneumonia occurring in a man of very bad constitution, in which it was thought expedient to have recourse to the influence of this plant, in the insomnia and delirium attendant thereon, in the hope that some similar examples may be recorded showing its utility in parallel instances :—

Driver W. P., "D," 4th Brigade Royal Artillery, aged 30, six years service; an unhealthy man, of strumous temperament. Has had repeated attacks of syphilis, and was recently discharged from hospital after treatment for mild secondary eruption. Has also suffered from pneumonia of right lung. Re-admitted on 26th October, 1865, with pneumonia of lower lobe of left lung; all the usual symptoms were present in an incipient form; considerable frontal headache being complained of; pulse 95; free purgation and alteration for 12 hours, all medicine being then omitted; essence of beef, with wine, were administered every two hours, day and night; pleuritis supervening on the following day, in a marked form; calomel and hyoscyamus, with counter-irritation, were employed, and were omitted on the sixth day of the pneumonic affection, the pleuritic symptoms having yielded to treatment; urine charged with lithates, and scanty; tongue moist, and free from sordes; dyspnœa more urgent; pulse more rapid. The essence of beef, with wine, were persevered with, and saline draughts, with nitric æther, were found of benefit in restoring the urinary excretion, but there was that absence of chlorides. The dyspnœa and engorgement of the lung still steadily increased, notwithstanding the increase in quantity of the restoratives and stimulants, and the regularity of their administration; pulse became more weak and rapid (105). On the seventh day the face became somewhat livid, attended by intermittent delirium; the dyspnœa very urgent; he expressed a liking for this nourishment, although the tongue continued much furred. On the eighth day the delirium had increased, assuming a violent character, yet the patient could be roused; countenance more livid; pulse more rapid (115), but was fuller than on the day previously. On the ninth day the pulse was less excitable, but the delirium had increased, and was more violent, having passed 60 hours without sleep. Fifty drops of tr. of digitalis were then given to him at noon. At three P.M. he was much less excited, but no sleep; pulse much quieter; the dose was then repeated. At six P.M., had become very much more composed; no return of maniacal symptoms; pulse, reduced in frequency. The same quantity of digitalis was again administered and at 10 P.M. he was sleeping soundly, and had been so for an hour; pulse quiet, and reduced to 85. He slept without intermission throughout the whole night, and awaking on the following morning, was much refreshed; no delirium; countenance less livid, and he stated that he had no recollection of any occurrence that had taken place during the last three days. The chicken-broth, essence of beef, wine, and eggs, were continued steadily, and he partook of them with more relish than usual. The dyspnœa, cough, and expectoration having been considerably relieved. Another drachm of tr. of digitalis was given on the following night, with equally happy results as regards sleep, salines having been taken through the day.

On the eleventh day considerable improvement was noticed; he was more lively, having showed signs of functional improvement; tongue was much cleaner, and the urine was free from lithates.

Steady convalescence ensued; the urinary chlorides became restored, but owing to the impaired constitution of the patient, progress was very slow. Ultimate recovery from the acute form of the disease took place, his general health becoming much improved by generous diet, with cod-liver oil and

mineral tonics, the lower half of the lung remaining in a hepatised state. He was discharged from the hospital on 6th December, 1865.

In this case the exhibition of opium was clearly contra-indicated during the delirium, deficient oxidation of the blood, shown by the influence of the countenance being present, and it is certain the disease would have terminated fatally on the tenth day had not the nervous derangement been tranquillized by the exhibition of digitalis.

A Case of Spontaneous Expulsion of a full-grown Fœtus, with Presentation of the Elbow. Reported by Dr. Boileau, 29th Regiment.

THE spontaneous expulsion of the fœtus, at or about the ninth month, is such a very rare occurrence that the following case is, I think, worth recording:—

A few days before leaving Malta for this station, I was summoned to attend the wife of a Serjeant of the regiment, who had been more than twenty-four hours in labour, the pains having been frequent and strong for four hours, and the membrane having been ruptured one hour.

The patient had had two previous miscarriages: one at three months, and the other at six.

Her pregnancy on this occasion appeared to be of about eight months' duration, but subsequently we found almost a perfectly full-grown child.

When I saw her the left elbow was protruding through the os externum; but it seems that the left scapular region was that first felt by the midwife in attendance, and such must have been the presentation, for over it there was a large purple tumour analogous to the caput succedanum. The left hand was in the vagina, and came down very easily.

On proceeding to make an examination with a view to determine the necessary proceedings, a very good pain quickly came on, and I found a considerable portion of the child's body advancing in the vagina. The os fully dilated, and all the soft parts remarkably lax, moist, and cool. This pain brought down the shoulders into view, the right arm nor the nates not yet appearing; the head evidently bent forcibly forward on the chest. Almost the whole of the cuticle was removed from the body. The child was dead. I therefore left matters for the time to nature.

A second pain came on after a short interval, and the child's nates—not one first, but both together—cleared the posterior fourchette; the nape of its neck in close contact with the os pubis.

Now, by gentle traction, the pain not being sufficient to do so, I brought down the legs; and the pulseless purple cord appeared. No further attempt was made to extract, but two drachms of ergot were administered.

In about four minutes a third pain forced the head out, the body of the child being supported in the axis of the lower outlet.

The uterus contracted rapidly, expelling an unusual quantity of blood and clots. The placenta was removed in five minutes by abdominal pressure. Her pulse was now 80, good, and she made no complaint. She convalesced well and rapidly, and embarked for Canada in eight days.

I had not either calipers or scales and weights, but the following measurements were taken on the spot:—Total length of child, 20 inches; length from occiput to pubis, 13 inches; circumference of head, taken round the orbital processes, 12½ inches (bones considerably overlapped); length of arm, 8 inches.

The nails were perfectly developed, and the membranæ pupillares removed.

A Case of Feigned Blindness and Loss of Voice. By Deputy Inspector-General J. Paynter, Shorncliffe.

PRIVATE A. M., of the 20th Hussars, born in Scotland, aged 27, seven years and a quarter service, more than five years of which had been passed in India, of good character, was sent to Shorncliffe in February 1867, from the Cavalry Depôt at Canterbury, for the purpose of being invalided and discharged from the service in consequence of the following ailments, which he was considered, by the Medical Officer in charge of the troops at the latter named station, to labour under, viz., cephalæa, accompanied by aphonia.

The detailed medical history, sent with him, explained that two years and four months before he had suffered from sunstroke in India, from the effects of which he had apparently never recovered; that for some time previous to his being sent to Shorncliffe as an invalid, he had suffered from chronic headache and aphonia, for which affections he had been treated with mercurials, cupping, blistering, &c., without any benefit.

On arrival at the hospital, Shorncliffe Camp, the man in question stated that he suffered from constant pain in his head, that he could not see, and that he had almost completely lost his voice. He answered questions in the lowest possible whisper, and it was most difficult to hear what he said.

Commencing to examine his eyes, I at once saw that he had not studied his part perfectly; for, professing to be totally blind, he at the same time insisted that he could not raise the upper eyelids, or allow the lids to be raised, in consequence of the great intolerance of light.

The Medical Officers present immediately made up their minds that the man was a malingerer; but being a stranger to them, it was determined to keep him under observation, and, if their opinions did not alter after a reasonable time, put him under the influence of chloroform.

The man was made to understand that he was suspected of feigning disease, but persisting in his original statements for six weeks, at the end of that time chloroform was administered in the usual manner.

As soon as the anæsthetic commenced to take effect, he began to sing most loudly, to the astonishment of the other patients and ward orderlies; but when its effects had passed away, such had been the force of habit for several months, he commenced speaking with a whisper. However, such was not permitted, and from that time he gave up making any further attempts to deceive. His headache ceased; his eyesight and voice at once became perfectly normal. He was a few days afterwards tried by a Court Martial for feigning disease, and sentenced to twelve months' imprisonment.

I have forwarded the above brief statement of this case, as its perusal may prove of use to the young members of our profession entering the public service.

A Case of Feigned Insanity. Reported by Dr. Boileau, 29th Regiment.

No. 984, a private in the 29th Regiment, aged 22, and having a service of 4 years, was tried at Malta, in September 1866 by a District Court-Martial, for attempted theft. He was convicted, and sentenced to 168 days' imprisonment, with hard labour. On a previous occasion he was tried for desertion, and fraudulent enlistment into another regiment. General character bad.

Whilst undergoing his last sentence; in fact, within a few days of his committal, symptoms of insanity became suddenly developed, he being, up to such time, in a good state of health and mental vigour. He became thoroughly insubordinate.

The Medical Officer of the prison sent him to the regimental hospital on the 26th of September. In the abstract of his case it was stated that he had reported himself sick on the 16th of the month, complaining of a pain in his head, for which aperients and rest were prescribed. On the following day he again reported himself sick, and was admitted into the hospital. He became very restless, continually getting out of bed, tied the window-cords round his neck, and tore up all his clothes. He would not answer questions, and talked nonsense. He was blistered on the nape of the neck, and antimony and opium were administered.

I made the following notes in the Case Book in January:—

"When first admitted into the Regimental Hospital, he conducted himself in the most eccentric, and sometimes violent, manner; wandering up and down the ward, catching flies, and tying them together by a string, calling them his Army, and himself King Sharpe; constantly fiddling with the window-ropes, which he tied round his neck, as I gave directions that he should not be prevented from doing so; dashing at everyone; attempting to bite people, &c. If asked, he complained of a pain in his head; but generally made little complaint as to his health. His pulse was good and normal, and

his appearance and condition was not that either of a sick man or of a madman.

"In reply to questions, he answered in a very ridiculous manner. He appeared to be the subject of hallucinations, but the delusions were of a very temporary character, as he evidently had the power of detecting that his sensations or imaginings were false; because he never acted as if they were real. The hallucinations were scarcely acted—they were stated.

"In a few weeks, however, he gave up this line of conduct, and adopted a totally different one; and it appears to us that this was in consequence of his knowledge that he was incapable of acting his part, either by words or deeds. Close and rapid interrogation tried him much, and I frequently adopted this method of detecting him. He suddenly ceased to answer any questions, appearing to be either deaf or dumb, or both. And so he has continued for more than three months. He walks up and down his ward, fiddling with a bit of string, or other article, with downcast eyes and slouching gait, obstinately refusing to answer any questions put to him."

I expressed my conviction at this time that the man was malingering, and Surgeon-Major Moorhead held the same opinion; but he desired that he should be still further observed, in order that the charge might be more fully proved.

The following observations were made a month later:—

"He still continues in exactly the same state, constantly walking up and down, like a fool; fiddling incessantly, with his fingers and teeth, any small article he may have in his hand. When spoken to, he generally pays no attention; sometimes he stops, and looks at one, but he does not like being stared at. He has been very forcibly told that his acting is of no use, as he will surely be detected and flogged; and he understood well what was said to him, as he betrayed his powers of hearing and reflection by blushing and other changes of countenance; yet he will not speak.

"After many interviews with him and mature consideration of his case, the inevitable conclusion is that he is a malingerer, and the grounds of such a judgment are the following:—

"First. There is a strong and obvious motive for his feigning disease, viz., to escape a severe punishment and probably be invalided.

"Secondly. The attack was sudden. When the malady is real the progress of the case is generally gradual; the exceptions to this rule can be accounted for. The appearance of assumed insanity is always sudden. (See Taylor's Medical Jurisprudence).

"Thirdly. He does not suffer from insomnia, anorexia, or other sign or symptom of physical or mental disease.

"Fourthly. People labouring under insanity are generally talkative; they hold imaginary conversations with imaginary beings, or they soliloquise. This man has not spoken for months.

"Fifthly. His silence is wilful and deliberate. That he can speak is certain, that he can hear is equally true, for he occasionally obeys directions given to him, like a rational being. His silence, therefore, is the result of deliberation, and is not objectless. He imagines, no doubt, that it will be considered one of the symptoms of insanity, which it is not, at least of that form which he endeavours to simulate, and further, he thinks it is easier to act the part of an insane person under the cloak of silence; it saves him much thought. His judgment was incorrect. He began by simulating the maniac, a part which he soon found he had neither the knowledge nor the skill to act; he gave it up, therefore, and became the idiot, whose part he has badly sustained. What he began with he ought to have gone on with. The sudden change condemns him.

"Lastly. He discovers by blushing, averted eyes, and changed expression, the emotions which are produced by explaining to him how impossible it is that he can maintain his part, and the certainty of his being flogged for malingering. The really insane would be insensible to such."

On the 1st March, 1867, the regiment moved to Fort St. Elmo.

Dr. Anderson, Inspector-General of Hospitals visited the man. I read for him the substance of the above remarks. He believed there was sufficient medical evidence to convict him, but recommended that we should try the effect of a blister to the back of his neck; and the effect was wonderful, for we discovered a new excito-motor for the ninth nerve.

On the 5th of the month, an orderly was sweeping out the ward, and the malingerer went up to him and whispered, "Now, Bently, I think you are a man I can trust, do you think I will get 'lagged' if I give this up; what is the best way to get out of it," or words to that effect.

On the 9th he was reported a malingerer. On the 10th he was discharged from hospital; on the 11th he was brought up with the rest of the prisoners for medical inspection, and was not easily induced to come into the surgery He did so, however, but would not speak.

He was tried by a district Court-Martial for malingering, and sentenced to receive 50 lashes, to be imprisoned with hard labour for eighteen months, and to lose all his past and future service, and advantages accruing from such. On the 18th of March this severe punishment was carried into effect.

When examining him for committal to prison I said: "You have been a very foolish man," and he replied, "Yes, Sir, I have been;" and these were the first words I heard him utter for nearly five months. He then confessed the whole deception, and gave me to understand that he was "put up to it," and acknowledged the justice of his sentence.

It is a remarkable fact that most of those who saw this man believed him to be insane. The very drummers who flogged him had to be punished for the too obvious expression of their compassion. It was said that no Court would convict a man of malingering with such an idiotic expression of face, and it is quite true that latterly he had the appearance and the gesture of an idiot; but this was neither a proof of his innocence nor a mitigation of his crime; it was the inexcusable and natural result of his deliberate wickedness. No man, could pretend to be a fool for six months, and retain the expression of intelligence. Six months have now elapsed since his punishment commenced, and he has very much improved in appearance in that time. He is doing his punishment, as he told me he would, "like a man," so far.

It is needless to enumerate the means of detection employed. They appealed, without response, to sensation and reflection. Inductine reasoning alone proved that the man was sane. There was no demonstrative proof, but the combination of probable proofs amounted so nearly to the "highest moral certainty" that he could not get the benefit of the doubt.

A Case of Feigned Rheumatism. Reported by Dr. Boileau, 29th Regiment Canada.

I was present for two days, not long ago, at a naval Court-Martial, which sat to try a sailor for malingering, feigning pains; he was found guilty. The prisoner cross-examined several medical witnesses, and one of these he asked: "Can you tell whether or not I have now a pain in my little finger?" I do not remember the answer, but I do the thoughts suggested to my mind. That man knew he could reduce any reply to the ultimate "No." "Then you could not assert that the pains I complained of were fictitious." He was a clever fellow, and was called the "Sea Lawyer" throughout the fleet, but he knew very little about disease. It was at once evident he would break down, and he did.

I was particularly anxious to hear the evidence given at this trial, as a short time previously a very bad character of the 29th had endeavoured to escape punishment by similar statements. He was brought to see his folly, however, without a Court-Martial.

This man had been awarded 168 hours' imprisonment, with hard labour, and 21 days' confinement to barracks.

He had been a few days in the cells, when he reported himself unable to do his punishment, in consequence of alleged pains throughout the body. He positively refused to get up in the morning.

On examination it was found that no evidence whatever of a such a condition existed, except bis own statement. He was sent, the following morning, to hospital, for the purpose of observation, and under such, he remained 14 days. Many careful examinations were made, with the result that his temperature never exceeded 98·6, a fact quite incompatible with febrile or inflammatory pains; nor did he lose flesh—a fact equally incompatible with the great suffering he expressed; no characteristic expression of pain was evinced by his

features; no permanent increase occurred in his pulse, which was generally quite normal.

It has been demonstrated that pain increases the force and rapidity of the pulse. Claude Bernard, to ascertain in many cases whether pain is felt or not by an animal under experiment, used a cardiometer, which is a delicate monometer adapted to a large artery (the common carotid); it measures, by the ascent of the mercury in the tube, the pressure of the blood, and intensity of the heart's action. It reveals latent impressions—so to speak—which no outward sign betrays. See Claude Bernard's Lectures on the Spinal Cord, "Medical Times and Gazette," January 1861.

It is inconceivable that he could have been in the great suffering he stated, without an augmentation in the force and frequency of the pulse.

He was discharged from hospital to duty, which he performed without complaint until he was again a cell prisoner.

He had been two days confined, when he absolutely refused to do any work. Although apparently in the most perfect health, he stated that he was not able to move.

On examination nothing was found to justify such conduct. He was sent to hospital a second time, with a similar result as before, there being no evidence but his own statement that he suffered from "pains." He was, therefore, sent back at once to his punishment, which he still, however, refused to do. He was accordingly brought before the Commanding Officer, who told him he would be tried by Court-Martial if he still persisted. He went to his punishment, and performed it that day and subsequently without any complaint, and when released, did his duty as well as any other man. He was tried for habitual drunkenness before long.

When a notoriously bad character is a prisoner or defaulter, and complains of such pains as render him incapable of doing his punishment, his statement must, I think, always be questionable; and it becomes us to institute the most searching examination into the case, in order that he may not suffer bodily harm by doing injurious work; or, on the other hand, that we may not open to him a door of escape from the just punishment of his evil deeds, great caution is necessary, and the truth must be arrived at by a method of exclusive diagnosis.

I have no doubt that this man had some pains, and he may have thought that he had a reasonable excuse from punishment, but he had not. If the diagnosis rested on the subjective phenomena, then was he suffering from a most severe attack of rheumatism; but the objective phenomena revealed no such state. If he had complained of slight pains, in all probability I would have endeavoured to relieve him; but, as usual in such cases, he said too much, and he brought suspicion on his statements at once. He never complained subsequently.

A Fatal Case of Pyœmia, accompanied by Pyœmic or Metastatic Multiple Abscesses of the Liver. Reported by Surgeon Perry, R.A.

In January 1867 I was requested to visit Sergeant W. W——, of the 6th Brigade, Royal Artillery, who was occupying a quarter as a married man, in Colewort Barracks, Portsmouth. This non-commissioned officer was a man of active and steady habits, good character, and strong physique. I found him in bed, suffering from very considerable abdominal pain, diarrhœa, and frequent emesis. His aspect was dusky, his pulse very weak, and his skin bedewed with a clammy sweat. I found that there had been no suppression of urine, but in other respects his symptoms were closely resembling an attack of cholera. Upon questioning his wife, I found that he had frequently suffered from attacks of a similar kind, though not of such intensity as the present one. Mustard plasters and fomentations were applied, and he was ordered some calomel in combination with opium, a stimulating astringent mixture being also prescribed. Directions were given that he should be removed to the hospital in the morning. On admission his aspect was very unfavourable, and he was evidently extremely ill. His tongue was foul, and covered with a yellowish-white fur; pulse 110, large and soft; skin hot about the trunk, but cool at the extremities. The abdomen was somewhat prominent, and

tympanitic, from gaseous distention, apparently of the small intestine. There was some tenderness at this time in the right iliac region, but not to any great extent, and meteorismus, though present, was very slight in that situation. There was some diarrhœa, but his chief distress arose from the vomiting, which was very frequent, and caused him much restlessness. The matters ejected were slightly tinged with bile, and the alvine dejecta were very fluid and dark in colour. In the course of two or three days he became jaundiced, the skin and conjunctiva ultimately assuming a deep olive yellow tint. At this time the tenderness in the right iliac region increased to absolute pain, and for this he was freely leeched, the relief therefrom being marked and lasting. His liver was slightly enlarged, and rather tender on pressure. The thoracic organs were unaffected; urine was dark-coloured, but not "portery," and gave only a very faint reaction to the tests for the colouring matter of the bile. On trying Dr. Harley's test, with sugar and sulphuric acid, it gave no evidence of the presence of bile acids in it. Its specific gravity was rather high, and a copious deposit of uric acid and urea took place on the addition of mineral acid. He was placed on beef tea and cold brandy and water, his abdomen being constantly fomented with stupes of hot water and turpentine. Calomel, James's powder, and Dover's powder were given him in small doses. As his illness progressed, he began to suffer under evening exacerbations of fever, and to sweat most profusely, his hands steaming with moisture when he placed them from beneath the bed-clothes. His sleep now became much perturbed, and he evidently suffered from disturbing dreams, delirium now also being sometimes present.

His pulse continued soft and full, and increased in frequency, the tympanitis persisting and increasing, with some slight tenderness on pressure, in the right iliac region, but to no considerable extent. The hepatic dulness, particularly on the lateral and posterior aspects, was increased, and deep pressure in the right hypochondrium gave him pain. Some three days before his death his face began to wear an anxious, haggard expression, the sweating became aggravated, his urine deposited large quantities of urates, deeply tinged with purpurine; the asthenia, marked from the commencement, became more intensified, and he now suffered from a well marked petechial rash over the whole body, but so efflorescent about the neck that it appeared almost like a scarlatinal rash. This rash was ineffaceable by pressure, and was evidently caused by a stasis of blood in the capillary system of vessels, due to the blood-poisoning under which he was suffering. His aspect was now very anxious, his breath had a cadaveric odour, he suffered extreme pain over the liver, his delirium and asthenia increased, and he died from mixed asthenia and coma, on the 12th February.

Post-Mortem Examination Thirty-six Hours after Death.—It was a subject of much regret to find that his wife objected to his being examined, but as some friends informed her that it was a most unusual thing for anyone to die from jaundice in a fortnight, she eventually expressed a wish that an autopsy should take place.

External Marks.—Numerous bright red ineffaceable petechiæ scattered freely over the front of the body and extremities; on the neck more diffused, and similar to a scarlatinal rash. On the posterior aspect of the body these petechiæ were livid in colour, and had coalesced into purpurous patches.

Abdomen.—Upon opening this cavity, the cause of the fatal termination of the disease was soon apparent. The right extremity of the omentum, and the cæcum about the situation of its appendix, were found to be of a dark colour, and adherent to the abdominal parietes. The adhesions were broken through and the gut opened. The intestine at this part was found to be ulcerated and thickened, the appendix being traced with much difficulty, as it lay embedded in a mass of dark and gangrenous tissue. A small clot of semi-putrid blood, with some decomposing and highly fœtid fæces were discovered upon slitting up what appeared to be the vermiform appendage. The superior mesenteric vein was now examined, and found to contain the characteristic clots of so-called phlebitis. In some places, although the calibre of the vessel appeared to be filled with solid clots, they were only apparently solid, as they were tunnelled out by the circulation, and formed tubes within the vessel, the adhering fibrin looking like the living membrane of the vein. This fibrinous coat was not, however, ad-

herent, in the true sense of the word, to the vein, as it could be most readily stripped off, and left the epithelial coat of the vein intact.

As this epithelial coat showed, by subsequent microscopic examination, the usual natural characters, it is only fair to conclude that the fibrin was a deposit from the blood in the vessel, and not the product of a diseased lining membrane; for, in some places, where the tunnelling of the deposit was less complete, these portions of decomposing blood-clot still remained, accompanied by a fluid exactly resembling pus.

Liver.—This organ, which was large and discoloured, was next examined, and found to be completely full of small abscesses, from the size of a millet-seed to that of a walnut. These metastatic abscesses were in most intimate connection with the various branches of the portal vein, spreading out from them like the leaves of a tree from its twigs; there must have been some hundreds of them in number. The portal veins were laid open, and the main divisions to the right and left lobes contained decomposing blood-clots, surrounded with a semi-sanious pus, or a fluid in all appearance closely resembling it. The blood in the smaller portal veins was in a similar state, and here and there one of the small vessels appeared on section as a long white streak, the lobules at the least unaffected parts being surrounded by a dark ring of congestion, which contrasted markedly with the white interior of the lobule. Except in the mesenteric glands, which were softened, broken down, and full of pus-like fluid, none of the other organs of the body were affected, the liver having acted apparently as an effective filter in preventing the decomposing elements from passing into the general circulation. It is to be noted that the above-named abscesses had no limitary membrane, but were, in fact, composed of the disintegrated elements of the necrosed hepatic tissue.

The origin of the cæcal implication was obscure, but from the amount of new tissue completely embedding the appendix, and also from there being a history of previous symptoms pointing to some affection of the intestines, it is considered probable that he had for a lengthened period been the subject of some obstruction or disease of that portion of the cæcum.

Remarks.—This case embraced many points of true pathological interest.

In the first place, the local pain and distress bore no proportion to the disease present, that in the cæcum being allayed almost completely by the leeching, or, perhaps, by the disorganizing process which so rapidly manifested itself.

Secondly, in the character of the jaundice, which was not that of retention of bile in the ducts (the gall-bladder was found to empty), but that of suppression and retention of the biliary *elements* in the circulation.

Thirdly, the character of the alternating fever and sweating as symptomatic of pyœmic poisoning and portal congestion.

Fourthly, the direct stages of cause and effect, as shown in the metastatic disease of the liver, through the medium of the mesenteric veins; and—

Fifthly, in the marked evidence that so-called "phlebitis" is not necessarily an inflammation of the lining membrane of the veins; for in this case the clots, which extended for some distance in different portions of the mesenteric veins, were apparently a product of the lining membrane on which they were deposited, and yet were found to have an existence perfectly separate from any diseased condition of the coats of the veins in which they lay. This was evidenced by the absence, above alluded to, of any morbid alterations in the epithelial or other coats, and by the fact that the fluid found in the veins and abscesses, though to the unassisted eye undoubtedly pus-like, was proved by the microscope to consist of corpuscles differing completely from those of ordinary pus, in being very much smaller than such cells, and of a character like that of a molecular and fatty *débris*, and in not giving the reaction of pus-cells with acetic acid. The above case well exemplified the new views held in respect to so-called "phlebitis," and which are so well expressed by Mr. Henry Lee, of St. George's Hospital, in his recent work on Diseases of the Veins.

A Case of Gun-Shot Wound of the Face.—Recovery.—By Assistant-Surgeon J. Munday, 21st Hussars, in Medical Charge Convalescent Depôt.

Private T. C——, 7th Dragoon Guards, aged 29, of 11 years' service, was sent up from Benares for change of air to Darjeeling, in April, 1866, having suffered from hepatitis in the plains, and which seemed to have restored him

to perfect health. He is a tall, well-made soldier. He is a man of somewhat violent temper. On the evening of the 28th November, while under the influence of liquor, an altercation occurred between him and one of his comrades, in their barrack-room; the former endeavoured to cut the latter down with his sword, but this weapon having been wrested from him, Private C—— rushed into an adjoining room, seized his carbine, and several rounds of ammunition, and before any one could stop him, plunged down the hill side and into the jungle. Parties were sent in pursuit, but in vain. The following afternoon, about 5 P.M., a European police-inspector, passing through the "Saddle Bazaar," about one-half mile from barracks, heard the report of a gun from an empty house close by. He entered, and found Private C—— stretched on the ground, bleeding profusely and with an empty carbine lying by his side. The inspector stopped the bleeding as well as he could, and with the assistance of a native policeman, helped the wounded man to walk to hospital, a distance of a mile and a half! The man has since stated that he wandered about the country after escaping from barracks. At mid-day on the 29th he procured and drank some native liquor, very intoxicating (and containing, probably, opium and Indian hemp), and that, while under the influence, he attempted to commit suicide by discharging his carbine loaded with a bullet while held close under his chin.

Immediately on admission he was seen by Staff Assistant Surgeon Scott, then in medical charge of the convalescent depôt, when the following condition of things was found. A large irregular blackened wound beneath the chin, to the left of the mæsial line; the ball had evidently entered here, passed upwards and forwards, fracturing the lower jaw about three quarters of an inch to the left of the symphysis, carried away a large portion of the anterior part of the tongue, swept away almost the whole of the hard palate, fractured both upper jaw bones, especially the left, a good deal of which latter bone seemed to have been carried in fragments by the explosion, and emerged between the eyes, driving before it the right and greater part of the left nasal bones, together with the nasal spine of the frontal. From the centre of the upper lip a huge irregular rent extended through the soft parts, perpendicularly up the centre of the nose, between the eyes, to a point about the middle of the forehead. Other minor wounds existed on the lips and cheeks; the eyes seemed to have escaped injury. The bleeding having ceased, the wounds were brought together with sutures and plaster.

After a little he became much collapsed; an unsuccessful attempt was made to administer stimulants through a catheter, but it could not be introduced far enough. Beef tea, brandy, and tinct. opium were then administered per rectum, and about 11 o'clock reaction set in.

November 30th.—Pulse very small, 122 in a minute, skin warm, had some sleep during the night; cannot lie down; this morning removed all the loose pieces of the upper jaw, and brought the edges of the lower jaw fracture into apposition, by tying the teeth with iron wire, washed out the mouth and lower wound (through which everything from the mouth passes) with a solution chloride of zinc, and administered beef tea, brandy, and tincture opium by the rectum frequently during the day.

December 1st.—Took advantage of the opening left by loss of the upper maxillary bone to pass a stomach pump, and administered some beef tea, at the same time continuing the enemata, which are well borne.

December 3rd.—Has fed himself with a syringe to-day, the wire connecting the lower jaw fracture has come undone, and a great gap exists between the ends of the bone. Dressed and brought the fracture together with a gutta percha splint and four-tailed bandage. It is most difficult to keep this fracture in situ, as the wound underneath must be kept open for frequent dressing.

December 5th.—Some oozing of blood from wound under chin during the night, jaw again displaced, refitted it with a double wire, gutta percha splint, and four tailed bandage; removed a portion of the left superior maxillary bone; suppuration commencing.

December 10th.—Slept pretty well last night; suppuration very profuse; lower jaw again displaced, and I don't expect it to unite, as now that the torn and bruised parts are becoming clean, I find that the edges of the fragments are all jagged and black. The upper maxilla of right side must be almost

entirely removed. The wound of the nose, which was drawn together and sewn up, has not united (unless at the inferior part), and will require to have the edges pared, and again brought together.

December 14th.—It is now evident that the loosened right superior maxilla is acting as a foreign body in the wound, and promoting suppuration to an extent which threatens to undermine the patient's strength completely. Its removal being determined on in consultation with Assistant-Surgeon Ambrose, 58th Regiment, an incision was made through the cheek, from the middle of the right side of the nose down to within half an inch of the angle of the mouth at the same side. Two vessels had here to be secured, and were the only ones that required to be ligatured during the operation. The incision thus made was about an inch and a half long, and gave ample room to detach the jaw, which came away tolerably easy in two portions, a considerable amount of traction and the use of the scalpel were the only agents required to remove it.

The wound in the cheek was secured with hair-lip pins and strips of plaster. The lower jaw (the fractured ends of which had not been for some time in apposition) was then reduced, and retained in position by wire bound round the three adjacent teeth on either side of the fracture.

December 20th.—The patient looks and feels very well since the removal of the jaw. The incision in his cheek seems to be quite healed; upper needles removed. The wire slipped off lower jaw during last night; it was to-day replaced in a similar manner to that adopted on the 17th, with the addition of bits of india-rubber (of the kind used for fastening paper together) inserted between the teeth, over the wire, to prevent the latter slipping up. This very simple contrivance answered its purpose admirably, never allowing the bone to become detached, and keeping the broken ends of the bone in excellent adoption until the fracture became thoroughly united.

By the 15th January, six weeks after the attempt to commit suicide, he had recovered sufficiently to allow of his being conveyed a distance of two miles, for the purpose of having his likeness taken by Dr. Simpson, civil surgeon, Darjeeling.

January 17th.—The edges of the wound made by the exit of the ball (about 2 inches long by nearly one wide) were neatly pared, and the sides brought together by three strong silk sutures passed in deeply, and secured on each side over pieces of gutta percha bougie. The raw edges of the wound came into very nice apposition, and the patient's previous good condition seemed to augur well for the result; when, unfortunately, his old complaint, hepatic derangement, set in the day after the operation, accompanied by vomiting and diarrhœa. Nothing could be more inopportune, besides lowering the patient's vitality, and so reducing the chance of good plastic matter being formed, the more mechanical agency of vomiting interfered sadly with the reparative process; so that on the 20th the following note was made:—

"The right border of the wound, particularly round the lower point of suture, commenced to slough last night. Took out the whole of suture, and found that about half an inch had already united at the superior portion of the wound. At the lower extremity union had obtained to the extent of about one-third of an inch; no union in the middle for two-thirds of an inch, but the gangrene which set in in the right border does not appear to have extended far under the integuments. Passed a needle suture through the inferior portion of the part that had united at the top of the wound, to prevent the newly-formed adhesions from giving way, and covered the whole with collodion and strips of plaster.

From the 18th to the 26th he was the subject of a very severe attack of congestion of the liver, and the following is noted in the case-book:—

"27th.—The wound is not looking at all well, and has given way at the lower portion, where union had obtained previous to the hepatic attack."

February 7th.—The patient is progressing favourably, and is now able to feed himself with a spoon. The wound under the chin (entrance) has healed, the lower jaw has united firmly, and the wound between the edges is beginning to improve.

February 24th.—General health moderately good; is able to walk about with the assistance of an attendant.

June 20th.—His health is improving, bu his gait is laboured and irregular,

one foot in walking overlapping the other, from diminished nervous power and an inability to control the movements of the lower extremities.

July 19th.—The portion of tongue remaining is very firmly bound down to the floor of the mouth, impeding utterance, this morning I divided with a pair of curved scissors some of the hard cartilaginous bands of adhesion. I would have almost liberated the tongue from its connections, but had to desist, the patient's stomach becoming sick, and faintness coming on.

July 20th.—States that he feels the tongue much freer, and certainly can articulate a little more freely.

August 5th.—This morning, with the assistance of Dr. Ambrose, 58th Regiment, I performed a plastic operation, with a view to covering in the unseemly gap in his face by cutting out a flap of skin and muscular tissue from the left cheek of sufficient size to cover the existing aperture. There was some little hæmorrhage while dissecting up the flap, which was easily arrested by torsion, and having carefully pared the edges of the opening, and making them extensively raw, the flap was twisted on itself, and I securely fixed it in its place by means of silver wire sutures. Warm cotton was then applied over the whole, and a little bag of hot salt placed across the face, so as to maintain a better temperature of the parts. Two pieces of sponge were inserted up the nasal cavities, so as to prevent any disturbance of the flap from the act of respiration.

August 6th.—The flap is in fair apposition, no swelling or puffiness of the face exists, a very small portion of the flap at the upper angle presents a dark appearance, but on the whole the circulation throughout is good, and union is apparently established, except at one spot.

August 8th.—Firm union of the flap, except at the distal angle close to the eye, where there was some difficulty in adapting the wire sutures. The surface of cheek from which the flap was taken is healing rapidly, sutures removed, a piece of lint soaked in weak liq. plumbi lotion applied over sore on cheek.

August 18th.—Wound in the cheek almost healed, the transplanted portion of integument perfectly healthy and of the same colour as surrounding skin.

September 3rd.—To cover in the remaining small gap still existing in the face, and also to rectify the position of the nose, which hung down very low, and overhanging the mouth, a second plastic operation was performed by removing a portion of the skin of the nose, accurately applying it to the remaining aperture, and securing the parts with silver wire; the margins of wound from which the flap was made were brought together by suture, and thus elevated the nose almost to its proper level. A broad band of sticking plaster was then placed under the nostrils, and fastened over each cheek, so as to support the organ in its new position, and allow of no strain on the sutures. Warm cotton and a small bag of hot salt were then placed over the newly-transplanted skin to preserve the temperature.

September 4th.—Some little bleeding occurred during the night, but the parts seem in nice apposition.

September 6th.—A portion of the flap (its distal end from the connecting bridge of skin), is black, and will, I fear, not unite; in proximal end the circulation is good.

September 12th.—The flap has firmly united for three-fourths of its extent over the late opening, and there now remains but a very small hole leading into the cavity of the nose. This organ is in very fair position. Having taken a wax and plaster cast of the interior of the mouth, with the assistance of a watchmaker in the 58th Regiment, I succeeded in getting a silver palate constructed, which fitted well, and enabled him to eat and articulate much better than before.

A case of Perforation of the Æsophagus by a Splinter of Bone; Ulceration into the Aorta; Death. Reported by Dr. Frederick Spry, Assistant-Surgeon, 2nd Life Guards.

On Tuesday the 24th March, 1868, Trooper T. D., of the 2nd Life Guards, attended hospital at the usual morning hour. He was a handsome, well-made, strongly-built Englishman, 22 years of age, and 6 feet 2 inches in height.

His appearance indicated the most robust health. He had only been in the regiment six months, during which time he had never been on the sick list.

He complained of indigestion, and slight pain and oppression of his chest, the result, he said, of eating his dinner too fast on the previous Saturday, and swallowing a piece of hard meat or gristle, which seemed to stick half way down. I would particularly direct attention to the above dates. He also said he felt quite able to do all his duties except riding, as trotting hurt him. His pulse was good, tongue clean, and bowels costive. He was excused riding for the day, and a purgative draught administered, and he was ordered to attend hospital the next day.

The next morning (March 25th), in answer to my enquiries, he said that his bowels had been freely opened, but that the indigestion was no better, and the oppression on his chest still remained, and he added that the piece of gristle seemed still to be half way down, and he fancied if he could be sick it would remove it. His pulse was about 80, rather full, tongue furred at the back part, skin cool, and he looked quite well.

He was very anxious to continue at his duty, but I excused him all duties for the day, and gave him an emetic of 20 grains of ipecacuana and a grain of tartar emetic, and told him to remain in hospital until the effect had passed off; afterwards to have a draught containing a drachm of tincture of hyoscyamus, ten minims of laudanum, half a drachm of spirit of æther in two ounces of camphor mixture.

I saw him again in the evening. The emetic had made him very sick, but the pain and oppression on his chest still remained, though he felt great temporary relief. I repeated the draught, and advised him to go to his bed immediately, and to attend hospital the next morning.

I must here remark that up to this time he was perfectly cheerful, appeared in no particular pain, and his manner seemed to imply that I was making more fuss about his case than the severity of his symptoms demanded.

The next morning (March 26th) he again attended hospital, and I was immediately struck with the marked change in his appearance. His countenance was pale and anxious, and he appeared very ill. He said he had passed a very bad night, and that the pain in his chest was now horrible, and was spreading all over his chest, back and front. He complained also of slight dyspnœa. He was immediately admitted, and ordered to bed.

I found no abnormal chest sounds, either by auscultation or percussion. His urine was normal. Specific gravity 1·020, pulse about 80, strong, full, and regular, but increased to 90 under examination. I noticed a peculiar thrill, or trembling sensation, communicated by the pulse (at the wrist) to the finger. His tongue was much coated, and breath offensive. Appetite quite gone. Bowels regular.

I ordered sinapisms to be applied to his chest, posteriorly and anteriorly at intervals during the day, and to take every two hours a draught nearly the same as he had taken on the 25th.

For diet I ordered him beef tea and arrowroot, but he was unable at dinner time to swallow either, though subsequently he managed to get down half a pint of cold milk.

I saw him frequently during the day. His symptoms underwent no change, with the exception that the pain seemed less localized. At 7.15 P.M. he knelt up in his bed for the purpose of micturition, and was talking to the other patients in the ward; he then replaced the chamber under the bed, and was in the act of lying down, when he suddenly, without a moment's warning, vomited several quarts of arterial blood right across the ward, and fell back dead.

I happened to be passing the hospital at the time, and hearing the alarm, rushed into the ward, and the scene I shall never forget. The whole place was deluged with blood, and the poor fellow lay gasping on his bed.

I should here mention that he was admitted under observation, for the feeling of doubt in my mind as to the true nature of his disease was so strong, that I could not bring myself to enter his case under the head of dyspepsia, although I confess I could not otherwise account for his symptoms.

At 9 A.M. the next morning I made the *post-mortem* examination. The lungs and pleuræ, heart and pericardium, liver, spleen, and kidneys were per-

fectly healthy, though the liquor pericardii was greater in quantity than is usually seen. The stomach was filled to distention with pure blood, in almost a liquid state. No ulceration or lesion could be found. In the centre of the middle-third of the æsophagus, however, there appeared a round, blackened patch of ulceration, about the size of a fourpenny piece, from the centre of which protruded the point of a small sharp whitish spiculum of bone. This piece of bone traversed a tunnel of ulcerated and infiltrated areolar tissue to the ascending aorta. At about 1¼ inches below the origin of the arteria innominata, on the inner surface of the ascending aorta was a patch of ulceration, exactly similar in size and colour to the one found in the æsophagus, but split right across, and through the centre of this rent appeared the other end of the spiculum of bone above referred to.

He had, no doubt, on the Saturday preceding his death, swallowed the splinter of bone, embedded in the piece of hard meat or gristle, to which he alluded when he first attended hospital; this, piercing the æsophagus, had ulcerated its way into the aorta, and the softened structure at length giving way, the blood found a passage into the æsophagus, and so caused the hæmorrhage which proved so rapidly fatal.

The spiculum of bone was 1¼ inches long, and the appearance like a small fish bone, but it proved to be a splinter of beef bone.

Case of Typhus Fever, reported by Surgeon Ovens, 5th Dragoon Guards.

PRIVATE E. O'R., an Irish cabinetmaker, of 15 months' service, was carried to hospital about 11 o'clock of the morning of the 30th March, 1867, having found asleep in one of the stables. He is a healthy young man, of fair muscular development. On admission he seemed to be labouring under well marked febrile depression, the face flushed, the expression dull and stupid, the pupils dilated to an extraordinary degree; has to some extent the appearance of a drunken man as he staggers when he attempts to walk, cannot see any object even when held at a little distance, and can only hear when addressed in a very loud tone of voice. He can give but a very imperfect account of himself.

On enquiry, I find he has been for some days past in attendance on a sick horse suffering from what the Veterinary Surgeon calls internal inflamation, for which the animal had been given large quantities of belladonna, and that the animal voided a great deal of wind of a fearfully noxious odour, and that O'Ryan had been for two days and part of a night in a stall with the animal, and had been up with it up to the period of its death at midnight, but that he had in no way come into contact with the animals medicine, which had been administered by the Farrier-Major in balls. The man had gone to bed, to all appearances quite well, at 12 o'clock, or soon after it; that he showed the greatest reluctance to get up this morning; had begged and implored to be allowed to remain in bed, and eventually when turned out had gone direct to a stable and lain down in the straw, where he was found at 10 A.M., and carried to hospital.

He complains of great pain in the epigastric region, which is increased by breathing; his tongue is red; pulse, 100; and has a tendency to sickness of stomach. To have emetic of mustard and sinapisms to stomach.

2 P.M.—Drowsiness continued; the emetic has acted well; to have two grains of calomel, washed down with five grains of carbonate of ammonia in effervescence.

8 P.M.—Drowsiness and stupor continued; pupils dilated to fullest extent; skin dry and hot; has sluggishness of intellect and confusion of thought; tongue dry and parched; urine scanty and high coloured; to have an enema and a stimulating diuretic mixture.

March 31.—Very little change; pulse, 120; lies in a stupor, and only speaks when addressed in a very loud tone. To have a table-spoonful every three hours of a strongly stimulant diuretic mixture.

April 1.—Tongue white and large; other symptoms much the same; pulse, 120; respiration much quickened; rhonchus audible below right nipple; expectoration of viscid mucos; dry-cupping to chest.

April 4.—Sordes on teeth and gums; had a good deal of delirium during

the night; incoherent and delirious when alone, but collects himself and speaks somewhat rationally to me; deafness still well marked; a few small blotches of a pinkish colour on trunk; expectorating high-coloured adhesive mucus, which he has difficulty in getting up.

April 5.—Pulse, 120; peculiar odour of typhus; well appreciable; sputa rusty coloured; dulness on right side well marked.

A blister to be applied over diseased portion of chest, and to take squill mixture with camphor and opium.

April 6.—Slept fairly last night, and is better in all respects; pulse, 100; expectoration more copious, and with little colour; dress blistered surface with mercurial ointment. Brandy beef-tea and jelly to be given at intervals throughout the day and night.

April 7.—Pulse, 80; skin cool; attends to and answers questions; the stupor is evidently clearing; the tongue is assuming a healthy look at the edges. From this time the amendment was rapid; he was not, however, discharged to convalescence until the 30th.

This case is interesting from its history and the fact of suspected poisoning by belladonna, before any of his previous history could be made, as immediately on seeing him I stated my opinion to the Hospital Serjeant-Major that he had taken belladonna, and after prescribing a stimulating emetic I went direct to the quarters, and there found out how he had been employed. It would be an interesting point to make out as to how far the vegetable and animal poisons may have entered the system through the medium of the lungs.

APPENDIX No. LII.

REMARKS ON THE CAUSES OF ANEURISM AND DISEASES OF THE HEART AMONG THE TROOPS IN SOUTH AFRICA.

By Robert Lawson, Inspector-General of Hospitals.

For 30 years past Medical Officers of the Army in the Cape Colony have noticed the frequency of, and high ratio of mortality caused by affections of the heart and great blood vessels. The earliest particular notice on this class of diseases in the medical records in that colony is by Dr. Nicholson, Assistant Inspector of Hospitals, in his first annual report, for the period ending 31st March, 1839, in which year the admissions amounted to 13·0 and the deaths to 2·7 per 1,000 of strength, and these affections have since continued, both frequent, and fatal.

It is not likely that this class of disease appeared among the troops coincident with the arrival of Dr. Nicholson in the colony, yet the Statistical Reports on the health of the troops there, from 1818 to 1836 inclusive, attribute three deaths only to affections of the heart, and nine to aneurism or ruptured blood-vessel, together amounting to a ratio of ·41 per 1,000 of strength, a fourth of the ratio for the period between 1838 and 1861. Inspector-General Taylor, my predecessor at the Cape, who had examined this subject, inclined to the opinion that, previous to 1836, the diseases under consideration had been included with diseases of the lungs, thus—

	1818–36.	1838–61.
Millesimal ratio of deaths from disease of lungs	3·90. ..	2·90
Ditto, from diseases of heart and blood vessels	·41 ..	1·64
	4·31 ..	4·54

And he thought it very probable that the change in the ratios of the deaths arose rather from a more accurate distribution of these according to their immediate causes, in the latter period, than to an actual reduction of the diseases of the lungs, and to an increase of those of the heart and blood-vessels.

In the Sanitary Reports for the Army, since 1859, the deaths are given from the various classes and orders of disease, both in and out of hospital, on the Station, and of the invalids during their passage home. The circulatory order embraces the affections of the heart and large vessels, and the respiratory and tubercular orders, the affections of the lungs. The latter may include a few other cases, but they bear but a small proportion to those from phthisis and hæmoptysis. Taking the millesimal ratios of the deaths from these orders for the seven years, and striking a mean (which is sufficiently correct for the present purpose) they stand—

Annual millesimal ratio for diseases of lungs	2·16
„ „ of heart and vessels	1·91
	4 07

Which, while they indicate a mortality from the two descriptions of affections little less than in the previous 40 years, continue to show an increase on those of the circulatory system, and a diminution of those of the lungs. It is true that, had the deaths of invalids on the passage home, and of men out of hospital, been all included in the former periods, the ratios might have been somewhat higher, and the comparison with the last seven years appeared less favourable.

That a more correct discrimination between the affections of the pulmonary and circulatory system may account for some of the increase in the diseases of

the latter now recorded, is very probable. From my own recollections of disease among the troops 30 years ago, however, I can say aneurism was a very infrequent cause of death at that time, and I met very little of it up to my return from Jamaica in 1860. This view, as to the greater prevalence of aneurism and affections of the heart among the troops of the British Army, is borne out by the death rate among them on other Stations at various periods since 1817. Thus the millesimal ratios of deaths from diseases of heart and vessels were in the periods—

	1817–36.	1837–46.	1859–65.
At New Zealand	..	..	1·18
„ Australia	..	..	1·72
„ Mauritius	·07	..	·53
„ Cape of Good Hope ..	·41	..	1·91
„ St. Helena	..	..	·31
„ Ceylon	·12	..	1·11
„ Madras	..	..	1·12
„ Bombay	..	..	·80
„ Bengal	..	..	·36
„ South China	..	..	1·16
„ West Indies	·15	..	1·02
„ Jamaica	·17	..	·85
„ Ionian Islands	·09	·23	·84
„ Malta	·07	·38	·53
„ Gibraltar	·15	·63	·70
„ Bermuda	·09	·27	1·25
„ Home	·23	·27	·93
„ Nova Scotia	·17	·30	·84
„ Canada	·09	·35	1·19

The same feature of increase in the last period over the first is perceived among the black troops, thus the ratios of deaths among these were in the periods—

	1817–36.	1859–65.
At Ceylon	·09	·86
„ Gold Coast	..	·76
„ Sierra Leone	·13	·00
„ Gambia	..	·86
„ West Indies	·07	1·06
„ Jamaica	·00	·89

The Returns of the Registrar-General of England present the same increase; thus the mean annual deaths per 1,000,000 living of both sexes and all ages, increased as in the following Table:—

Diseases.	1838 to 1842.	1850 to 1854.	1855 to 1859.	1860 to 1864.	1865.
Pericarditis	10·0	32·6	59·7*	74·6*	73*
Aneurism	7·6	16·2	17·8	20·2	24
Heart diseases	258·0	651·2	735·4	916·6	1,021

There is no doubt that the greater familiarity with the symptoms of diseases of the heart and great vessels has led to a more accurate discrimination of such

* From 1856, the deaths given in the Supplemental Table of deaths, as from rheumatism with pericarditis or heart disease, have been combined with those from pericarditis alone.

cases, and part of the apparent increase in the mortality from them, in the latter years, must be attributed to improved diagnosis, but it is difficult to suppose that this will account for it all. In the Army, as it has been the custom for post mortem examinations to be made in most of the fatal cases the original errors of diagnosis would be corrected to a large extent, and, judging from my own recollections, the frequency of vascular disease has materially increased of late years.

The mortality among the troops from this class of disease is not only considerably in excess of that among the civil male population of corresponding ages, but differs greatly as to the relative frequency of the various affections embraced in it; thus, from 1859 to 1865 inclusive, the aggregate strength of the troops at home was 484,258, and the deaths from all causes 4,334, or 9·02 per 1,000. Of these, there were the following numbers of the ages of—

	15 to 24.	25 to 34.	35 to 44.
Numbers of troops	268,124	166,708	45,426
Mean annual mortality per 1,000 in male population in England, 1859-65	7·42	9·78	13·40
Corresponding deaths for number of troops..	1,990	1,630	609

These amount to 4,229, or 8·81 per 1,000 of strength, corresponding very closely to the actual mortality among the troops.

The total deaths among the male population of England of the above ages, from 1859 to 1865 inclusive, were—

	15 to 24.	25 to 34.	35 to 44.
Total deaths	95,687	95,542	104,434
Of which, from aneurism	73	410	638
From pericarditis, and pericarditis with rheumatism	983	592	629
From heart diseases, not specified ..	3,218	4,487	7,080

and reducing the latter in the ratio of the total mortality at each age among the civil population to the corresponding deaths for number of troops, the following results are obtained:—

Deaths.	15 to 24.	25 to 34.	35 to 44.	Total.	Ratio per 1,000.
From Aneurism ..	1·5	7·0	3·7	12·2	·03
,, Pericarditis ..	20·4	10·1	3·7	34·2	·07
,, Heart diseases .	66·9	76·5	41·3	184·7	·38
Total	..	..	..	231·1	·48

The actual deaths among the troops during the period under consideration with their millesimal ratios were as follows:—

	Deaths.	Ratio per 1,000 of Strength.
From Aneurism	164	·34
,, Valvular disease of heart and hypertrophy .	92	·19
,, Diseases of heart, not specified	149	·31
Total	405	·84

Thus aneurism appears to be eleven times more fatal among the troops at home than among the male population of the same age, and affections of the heart also more fatal in the proportion of ·50 to ·45 per 1,000 ; and, were those discharged from the service on account of cardiac disease, retained until their cases terminated, as in civil life, the ratio of mortality would be considerably higher. As the numbers discharged for each disease are not given in the reports of the health of the Army for the troops serving at home, the extent of this cannot be determined.

Extending the examination to foreign stations the much greater frequency of deaths on the Station from aneurism, relatively to those from affections of the heart, than amongst the civil population in this country, is still apparent, though, if the cases invalided be included, this is less marked. The following are the deaths, and numbers invalided who subsequently either died or were discharged, for the forms of diseases specified.

Stations.	Deaths on Station, 1859 to 1865.			Invalids Discharged or Died, 1863–65.		
	Aneurism.	Valvular Disease of Heart.	Heart Disease.	Aneurism.	Valvular Disease of Heart.	Heart Disease.
New Zealand, Australia, Mauritius, Cape, St. Helena	54	29	35	7	82	1
Ceylon, Madras, Bombay, Bengal, South China..	88	109	115	28	466	75
West Indies and Jamaica	4	3	4	1	11	..
Ionian Islands, Malta, and Gibraltar.	25	10	18	4	69	1
Bermuda, Nova Scotia, and Canada ..	34	22	18	4	38	4

It thus appears that aneurism and valvular diseases of the heart are the forms chiefly met with, and had those cases returned under the general term heart disease been more carefully diagnosed, there is no doubt many which now stand under that designation would have been shown as valvular diseases.

Many causes have been assigned for the frequency of diseases of the heart and great vessels among troops in South Africa, none of which appear sufficient when examined into. Of these great exertion during the Kaffir wars, the excessive use of boer brandy, tobacco, and carrying the knapsack, have been most dwelt on, but the diseases have been as frequent among men who went to the colony subsequent to the last war, as they were during its continuance, and they are not more frequent among those who indulge in "Cape smoke," or tobacco, very freely, than among others who use them sparingly. Of late years troops have always had their knapsacks carried on a march in that country, yet the frequency of this class of diseases is, if anything, on the increase. Some other cause, or combination of causes, must therefore be searched for, to account for their great frequency, which, as has been shown above, though most prevalent on the Cape Station, has caused a high ratio of mortality on many others.

While in charge of the Medical Department on the Cape Station, I collected as many facts as I could obtain from the various Medical Officers concerning the history and post mortem appearances in the fatal cases of diseases connected with the circulatory system, as they occurred. In some of the cases the details procured were pretty full and satisfactory ; in others many points which fuller inquiry or closer observation at the time might have supplied, were less clearly made out, and subsequent inquiries failed to supply what was desired, but a body of evidence was nevertheless gradually accumulated which illustrates several steps in the progress of these diseases. In what follows I will endeavour to arrange that information as concisely as the subject will admit of, taking the cases in that order which will best illustrate the various phases of the subject.

The first case to be noticed occurred at Cape Town, in a man of the 2nd Battalion 11th Regiment. I was present at the examination of the body, and can answer for the accuracy of the details, which, it will be seen hereafter, have an important bearing on the whole subject.

Private Edward Clegg, aged 26, five years in the service, of which 2⅛ years were at the Cape. He had not had venereal, nor taken mercury since he enlisted, nor had he suffered from rheumatism, but had had an ulcer on the leg for nearly 12 months after his arrival at the Cape, though there was reason latterly to believe he kept it open himself. On 18th July, 1863, he was re-admitted with ulceration inside the right cheek, accompanied by a generally decayed state of the teeth. The ulcer closed under the use of an astringent wash; towards the end of August a boil formed outside, over the site of the previous ulcer; this was getting well when, on 9th September, about 11 A.M., it was reported to the Medical Officer he had a fit; he visited him at once, found him blanched and pulseless, and he died immediately. The man had made no complaint of any uneasiness about the chest previously. On examining the body, the pericardium was found distended with blood, and there was a thin layer of recent false membrane all over the heart, from which it could be stripped off easily; this contained no blood, and was quite distinct from the coagulum of blood surrounding it. The heart itself seemed slightly enlarged. The right side of the aorta was tumid, and the coats much thickened, commencing half-an-inch above the heart, and extending upwards about an inch and a-half; in the centre of the thickening the surface was much congested, and underneath that a circumscribed cavity, about half-an-inch in diameter, between the fibrous and muscular coats of the vessel. The sac had given way by an irregular opening along the centre of the congested part; from its opposite side there was a communication into the canal of the aorta. On the inside of this vessel the opening presented three slits, of rather more than one-eighth of an inch long, radiating from a centre like a large leech bite. The edges of the slits were abrupt, with their margins congested like those of a phagadenic sore, and the action of the muscular fibres behind them bent them backwards, causing a cup-like depression. There were a few very slight traces of atheroma in the lining membrane of the aorta. The semilunar valves, as well as those of the pulmonary artery, and the mitral and tricuspid valves, and endocardium, seemed natural. The liver, kidneys, and spleen were all much congested; the lungs free from it. The thymus gland was large. In this case there was clearly inflammation of the pericardium, and of the right side of the ascending aorta inside the pericardium, which had led to the formation of a small abscess there; it seems probable from the appearance of the aperture that this opened into the aorta in the first instance, and that the pressure of the blood caused the sac ultimately to burst into the pericardium, and caused death. Whether this explanation be correct in all its details, or not, however, the fact remains that inflammation took place in a circumscribed portion of the coats of the aorta, followed by abscess, and led to perforation and fatal hæmorrhage. The heart and aorta in this case were preserved, and sent to Netley.

The following case presents much the same character as that just given, though the details are less minute.

Private A. Burbage, Cape Mounted Rifles, aged 21, five years in the service, had led a very irregular life until six months previous to his last illness, and had been several times under treatment for venereal. Some days before death he complained to his comrade of uneasiness in the region of the heart, but did not report himself sick. On 28th August, 1865, while getting himself ready for guard, he fell back on his bed, and expired immediately. On examining the body, a rent, half-an-inch long, was found on the right side of the aorta, a little above the heart, from which effusion of blood had taken place into the pericardium. The coats of the vessel around the fissure were thickened, but there was no trace of an aneurismal sac at the part.

In the following case also there seems to have been inflammation of the arterial coats, and most likely abscess, leading to rupture of the vessel: Private John Mitchell, 1st Battalion 9th Regiment, aged 29, died suddenly in barracks at Cape Town, on 16th February, 1867. He had been treated for syphilis and gonorrhœa at various times, and had been in hospital 25 days in October and November 1866, for continued fever, and in January 1867, three days, for

bronchitis. On examining the body, a small cavity was found on the arch of the aorta, surrounded by redness and thickening. The sac was thin, generally soft, and had opened into the right pleura, which was filled with blood. The condition of the lining membrane of the aorta was not noticed. The pericardium was adherent to the heart in parts, and the edges of the mitral valves thickened.

The next case to be noticed seems also to have proved fatal by the coats of the aorta giving way by a rent, without the formation of an aneurismal sac. Private Tighe, 2nd Battalion 10th Regiment, aged 26, with five years' service at home and in the Cape colony, while a prisoner in the Provost at King William's Town, strained himself in the loins on 16th March, 1864, lifting a heavy weight. The pain continuing, he went to hospital on the 22nd, when the bladder had to be emptied by the catheter, and the urine was found to be tinged with blood. Shortly after admission, symptoms, supposed to be those of pneumonia, presented themselves, but disappeared under the treatment pursued. On the night of the 29th March, he suddenly became very uneasy, groaned deeply, became insensible, with a livid pinched appearance of face, and died in about an hour. On the post mortem examination, the heart and lungs were found healthy. There was a rent in the anterior surface of the aorta, about 2½ inches below the diaphragm, from which a large quantity of blood had escaped, forcing the peritoneum upwards and forwards, so that it overlaid the pancreas, thrust the duodenum aside, partly overlapped the spleen, and forced the stomach and contents of thorax upwards. There was no notice as to the condition of the coats of the aorta at the position of the rent, or in its neighbourhood, but the absence of an aneurismal sac, and the nature of the opening, leave little doubt that it was dependent on a similar cause to that in the cases already given. From the symptoms, and absence of the indications of hæmorrhage, there could have been very little, if any, blood effused until shortly before death.

In the next case to be mentioned the superior vena cava was the vessel implicated. Private John Casey, 96th Regiment, 26 years of age, with 8 years' service, most of it at home, and at the Cape; stoutly made, and apparently healthy, was found dead in a water-course which passed the barracks at Keishkama Hock, where he was quartered, on the 29th March, 1864. He had been seen intoxicated the previous afternoon; there were no marks of injury on the body. On examination a longitudinal fissure was found in the posterior part of the vena cava superior, just above its termination in the auricle. This communicated with the left pleura, in the cavity of which about two quarts of blood were found. The edges of the fissure were ragged, and the coats of the vessel thickened at the part. The heart was enlarged, but whether otherwise normal was not mentioned. The right pleural cavity was obliterated by old adhesions. In this case, as in those already detailed, circumscribed inflammation of the coats of the vessel seems to have been the immediate cause of their giving way. A case of rupture of the vena cava occurred in New Zealand in 1863, but no details are given in the statistical reports for that year as to its nature.

In addition to these cases involving the larger vessels, there were two in which the popliteal artery was implicated. These occurred in men of the 67th Regiment, within a few months of each other; both had come from China in 1865. In the first, Private J. Cottrell, aged 26, in the beginning of March 1866, while walking across the barrack square at King William's Town, trod on a hoop, which sprung up and struck him in the left ham; this was followed in a short time by swelling of the part, extending to the upper portion of the calf. On the 24th March he reported himself sick, when a pulsating tumour was found in the popliteal space, which disappeared on compressing the femoral artery in the front of the thigh. Pressure was employed over the femoral in the latter situation, at first, apparently, with advantage, but after a while the swelling increased, became diffused, and the integuments over it threatened to ulcerate, when amputation was performed on 23rd May. The swelling was caused by a large mass of blood infiltrating the muscles and parts surrounding the artery; there was an irregular opening in the coats of the latter, but without any distinct aneurismal sac.

The other case was that of Private Dennis Quohane, aged 38; on 1st June, 1866, while bathing at King William's Town, he felt as if something gave way in his left ham, and subsequently, while walking home, the limb was stiff.

The regiment left for Graham's Town about the 10th June, and arrived on the 16th. After the first day's march the pain at the part was so considerable as to make him walk lame, but he did not report himself to the medical officer. On 24th June he went to hospital, when a distinctly circumscribed, pulsating tumour, about the size of a hen's egg, was detected; this collapsed on compressing the femoral in the upper part of the thigh. Flexion of the knee-joint, and compression of the femoral in front of the thigh were employed for many days, but the tumour continued to extend until it occupied the whole popliteal space and upper part of the calf, and it pulsated as freely as ever when the pressure was removed. On 21st August the femoral was tied above the sartorius, which stopped the pulsation at once, and the collateral circulation, having been favoured by the pressure of the main trunk previously, was fully re-established very early, and the limb scarcely lost its natural temperature. About a fortnight after, however, the integuments in the ham over the original tumour became irritable, and ulceration ensued, giving exit to a bloody sanies. After a few threatenings, violent hæmorrhage came on, when Assistant-Surgeon Close, 2nd Battalion, 5th Regiment, who had charge of the case, immediately amputated in the middle of the thigh. Like the previous case, this one presented no aneurismal dilatation of the popliteal artery, but its coats had given way by a longish fissure, and the blood was effused into the neighbouring tissues—at first in a circumscribed manner, but afterwards it became more diffused.

These cases prove, pretty conclusively, that phlegmonous inflammation of a limited portion of the coats of the larger arteries and veins is by no means rare at the Cape, and, whether by the formation of abscess, as in Clegg's case, or merely by infiltration and softening of the tissues, as would seem to have taken place in some of the others, their elasticity was so reduced they could no longer withstand the pressure of their contents, and rupture took place, leading to effusion of blood causing death, when the surrounding parts did not offer resistance to its escaping in sufficient quantity, and simulating aneurism when this impediment existed. In the fatal cases the death was generally sudden, the individual having made no complaint previously, though it may have been that, like Burbage, he experienced uneasy feelings, but did not consider them of sufficient importance to require attention. Such feelings are by no means uncommon, especially during the warm weather at the Cape, when they seem rheumatic in their nature, and connected with checked action of the skin. In Clegg's case there were very slight traces of atheromatous degeneration in the serous coat of the aorta, but the perforation was quite independent of this, and in that of rupture of vena cava, and the two popliteal cases, the vessels displayed no trace of the degeneration; in the others this point unfortunately was not particularly noticed.

The cases of Cottrell and Quohane illustrate one cause of the apparent failure of pressure, or even ligature, to cure aneurism; there being no sac, the blood effused into the surrounding tissues acted as a foreign body, and prevented the repair of the breach in the coats of the vessel, and, on the establishment of the collateral circulation in the latter, hæmorrhage again took place, in the manner long ago described by Mr. Guthrie as occurring in cases of divided arteries tied at a distance from the seat of injury, instead of both ends being secured in the wound itself; when a sac has been formed the neighbouring tissues remain in a comparatively healthy condition, and either pressure or ligature may give time for the consolidation of its contents which the weak collateral circulation is not then able to disturb.

The fatal termination having taken place, in most of the cases detailed above, while the local alterations in the vessels were well marked, these were brought to light, and their nature made out, but it is quite in accordance with our experience of similar affections of other parts of the system, that they frequently become resolved, leaving a greater or less amount of alteration of texture, and change of function, behind them. The cases next to be detailed seem to be of this character, and to have originated in circumscribed inflammation in the coats of the vessel, which had not become ruptured, as in the previous cases, but had proceeded a considerable way towards resolution, but with such diminution of their cohesion that a gradual stretching took place, and an aneurismal sac commenced. This, when situated among parts which gave it support, generally attained a considerable size; when in the free part of the aorta,

within the pericardium, it always burst very early, unless the aneurism extended into the substance of the heart, or obtained the necessary support from adherent pericardium.

The first of these cases was that of Private Wright, 96th Regiment, aged 40, a stout, healthy-looking man, of 22 years' service. He had not been in hospital since 1859, and it was not known whether he had been affected with rheumatism or any other complaint since. A little after dusk, on the evening of 3rd January, 1865, while walking with some comrades in the vicinity of the Drosdty Barracks at Graham's Town, he separated from them, and went with a female, who returned in a few minutes and informed them he was very unwell, and on their proceeding to the spot they found him dead. The pericardium was found full of blood, which had escaped by an opening about the size of a goose-quill, in a small aneurismal sac on the right of the aorta, a little distance above the heart. On laying open the vessel, the orifice of the sac was found large, and its interior corrugated, without any lymph deposited in it. It was about the size of, and resembled the impression of half a walnut-shell. There was very little indication of disease in the serous coat in the vicinity, and the aortic valves were quite healthy.

The next case was that of Private W. Cue, 1st Battalion 9th Regiment. On 2nd July 1866, at Cape Town, while leaning over a billiard-table to make a stroke, he suddenly felt faint, and died in a few minutes. On examination the pericardium was found full of blood, which had escaped from a small aneurism about the size of a filbert, on the right side of the aorta, near its origin.

A similar instance occurred in Private J. Blamire, 1st Battalion, 10th Regiment, at East London. This man had been under treatment 17 days for subluxatio, and was discharged from hospital on 14th November, 1866; subsequently to which he seems to have been employed as hospital orderly. Though muscular, he was sickly in appearance, but made no complaint. At 7 A.M. on 22nd December he was lifting a can of water from a barrel, when he fell down, gasping for breath, and died immediately. An aneurism, the size of a pigeon's egg, was found on the posterior part of the ascending aorta; the sac had given way, and the pericardium was filled with blood. The aortic valves were quite healthy.

In two of these cases there was very little disease of the internal surface of the aorta, or of the aortic valves; in the other, evidence on this point is wanting. All these illustrate the tendency to early rupture, when the walls of the vessel are not surrounded by other tissues in close connection with them, which support the sac as it gradually expands. In the next case to be detailed, though within the pericardium, the necessary support was given by that having become adherent, and it proved fatal, not by rupture, as in the others, but by the impediment to the circulation caused by the pressure of the sac over the origin of the pulmonary artery.

Private J. Spurgeon, 2nd Battalion 5th Regiment, had been under treatment at Graham's Town for about three months, with what was described as Morb. v. Cordis. At this time (the middle of March) adema of the lower extremities made its appearance, and gradually extended, accompanied by difficulty of breathing unless in the sitting posture, but without any other prominent symptom. He died suddenly, in the night of the 11th April, 1867. The heart was found enlarged, and the pericardium adherent over nearly its whole surface, including the origin of the great vessels. There was an aneurismal sac, larger than a walnut, at the origin of the aorta, between that and the pulmonary artery. The pressure exercised by this sac on the pulmonary artery had evidently checked the flow of blood through that vessel, and led to the anasarca and other symptoms characterising the case in its latter stages. I saw a somewhat similar case at Malta, in a man of the 77th Regiment, about 30 years ago, in which the aneurism rose from the aorta behind one of the valves, and the sac was in the septum of the ventricles, bulging into the origin of the pulmonary artery. This obstructed the flow of blood through the right side of the heart, and caused extensive anasarca and ascites. The case proved fatal by the sac bursting into the right ventricle. The parts were preserved, and sent to the Museum at Chatham.

I was asked to look at a man of the 2nd Battalion 11th Regiment, at Cape Town, in 1863, in whom there was an aneurism extending into the heart. In

this case there was severe orthopnœa, with considerable œdema of the lower extremities, and some fluid in the peritoneum. The pulse was regular, slow, but small. The first sound of the heart was natural as to length, but accompanied by a strong bruit, which was loudest over the space corresponding to that between the aorta and mitral valves. There was no second sound heard, but, instead, a prolonged bruit, continuing almost the whole period of the diastolic movement, of the same character with that accompanying the first sound, and which was in its greatest intensity over the same space; both became fainter as the lower surface of the heart in contact with the pericardium was approached. Under the left nipple no anormal sound was heard with the first sound, save that already mentioned, and then much less intense than in the original locality. There was no pulsation of, or remarkable fulness of, the jugular veins on either side, and the surface veins generally were not distended. The man died the same evening. On examining the body considerable serous effusion was found in both pleuræ, and in the peritoneum. The valves of the aorta were much diseased, rough, and congested—one perforated by several holes. There was an opening in the aorta, behind one of these, which led to an aneurismal sac in front of the pulmonary artery, and between that and the right auricle, that could contain a hen's egg. The mitral and tricuspid valves were nearly natural. There was some thickening of the pericardium in places, but no roughness of it anywhere. The situation and character of the bruit in this case indicated something very different from ordinary valvular disease, though it would have been difficult at the time to account for it; though the regurgitation through the perforated valve, and between the valves, may have contributed something to the sound which took the place of the second sound, still the locality over which it was heard indicates the flow of blood from the aneurismal sac as having been chiefly concerned in its production. The resistance offered by the muscular substance of the auricle seemed sufficient in this case to prevent the rupture of the sac, while, as in the two cases previously noticed, the obstruction to the circulation through the right side of the heart had led to serous effusion into the pleura, peritoneum, and areolar tissue of the extremities, as if there had been insufficiency of the tricuspid valves.

In addition to the cases above detailed notices of other 10 cases of aneurism came before me, in all of which the disease was outside the pericardium, and in each a sac of the usual description had formed and attained considerable size. Of these there were two in which it arose from the ascending aorta, six in which it sprung from the arch, one in which it seemed to rise from the artery itself just below the diaphragm, or from the cæliac axis, and another a little above the bifurcation into the iliacs. All of them were fatal except that near the cæliac axis, which, under the influence of restricted diet, and rest in the recumbent posture, gradually consolidated and diminished, and the patient, Serjeant Purdy, Royal Engineers, returned to England and was in comparatively good health more than a year after. In another case, in which the sac arose from the arch, restricted diet with quiet was employed for some time with a diminution of pulsation, and apparent consolidation of the contents of the sac, but afterwards, as the patient was considered anæmic, his diet was increased, and after the lapse of some three months the aneurism began to enlarge, and ultimately became diffused and proved fatal; a large mass of tough fibrine was found in the site of the original sac. In this case, though the calibre of the aorta was increased, its lining membrane presented no trace of atheromatous thickening, and all the cardiac valves were healthy.

Of the two cases affecting the ascending aorta, one burst into the left bronchus, the other had caused partial absorption of the rings of the trachea, but death ensued without rupture. Of those which were connected with the arch one burst into the pericardium, one into the trachea, one into the æsophagus. In two others death occurred apparently from spasm of the glottis, and in the sixth from the diffusion of the contents of the sac above mentioned. In most of these cases the existence of the aneurism had been detected some time before death; in two, at least, though the symptoms indicated aneurism, yet no bruit could be made out, though watched for. In one of the cases, that of rupture into the pericardium, the patient himself seems not to have suspected it, as he had never complained, and died suddenly in his barrack-room; the aneurismal sac was as large as a hen's egg. The sac in those cases in which the bruit could

not be detected sprang from the back of the arch, and by its pressure on the trachea and œsophagus caused cough and difficulty of deglutition; while by implicating the recurrent nerve spasms of the glottis, and paroxysms of difficulty of breathing were induced.

The condition of the lining membrane of the aorta has not been specially noticed in most of these cases; and, therefore, it is probable it presented nothing very unusual. In one of them it was extensively pitted, as described by Rokitansky to follow the wasting of the patches of atheromatous degeneration; in one of those already mentioned it was quite free from any trace of this degeneration, and there was no valvular disease in the heart, showing that the origin of the aneurismal sac is really not necessarily connected with either of these, though they may be frequently found together in the same subject. The immediate cause of aneurism, I conclude, from the facts mentioned in the former part of these remarks, to be phlegmonous inflammation of a limited portion of the coats of an artery, followed by abscess, or simply infiltration, which so weakens their resistance as to permit of dilatation, which either leads to early rupture, or the gradual formation of a well-defined sac, as already described. The cause of valvular disease of the heart, on the contrary, seems connected with a rheumatic diathesis, and in this country generally accompanies rheumatic fever with well marked affection of the joints. Such cases of highly developed rheumatic fever are extremely rare among the troops in South Africa, but muscular rheumatism, implicating the parieties of the chest, is particularly common during the warm weather, and there are few persons, whose occupations require them to take active exercise, who do not suffer from it more or less, and not unfrequently to a disagreeable extent. When covered with perspiration, an individual, if detained in a draft, is apt to suffer from rheumatism of the muscles of the chest, or from congestion of the bronchial membrane, or from undefined uneasiness deep in the left side of the chest, which at times appears to arise from implication of the diaphragm, but at others it is difficult to localize. There is a great tendency too, at that season, to an excitable condition of the heart, which may be brought on by moderate exertion, or slight chill, though there may be no physical sign of either pericardial or endocardial disease. The frequency of these affections, of the muscular parieties of the chest, and the contained organs, show the possibility of the rheumatic affection of the former being accompanied in certain diatheses by that development in the latter which terminates in permanent thickening and disease of the valves, or of the lining membrane of the arteries; and it is in this way I apprehend we must account for the great frequency of the valvular affections of the heart in South Africa.

In addition to those cases of aneurism in which the aortic valves are found affected, there were seven fatal cases of valvular disease of the heart without complication with aneurism. Of these the tricuspid and mitral valves were chiefly implicated in one case, the mitral and aortic in another, and the mitral alone in the third; but accompanied in that instance by acute inflammation of the kidneys, which no doubt determined the fatal result. In the other four cases the aortic valves were chiefly affected, and there was more or less induration of the commencement of the aorta, with enlargement of its calibre, and atheromatous disease of the lining membrane. There was a variable amount of hypertrophy met with in these cases, and as usual they generally presented intercurrent pneumonia and congestion of liver and kidneys towards their termination.

Besides the cases of valvular disease which proved fatal on the station, a considerable number of men were invalided for these affections. The aortic valves were those most commonly affected, the mitral more rarely, the tricuspid least frequently of all. The conviction that the climate of the Cape was likely to aggravate such cases, led to their being invalided on the first occasion after the symptoms were sufficiently developed to indicate their nature, and most of those so sent home were afterwards discharged from the service at Netley.

APPENDIX No. LIII.

THE NEW ZEALAND WAR, 1866-67.

By Deputy Inspector-General GIBB.

SUPPLEMENTARY MEDICAL REPORT.

THE medical history of the war in New Zealand during the years 1863-64, and '65 has been fully and ably described by my predecessor, Inspector-General Mouat, V.C., C.B.

In 1866 field operations were resumed, and a brief sketch of this campaign is now offered, presenting, besides the marked peculiarities of this warfare, the novel feature of a contingent of friendly Maories being regularly associated with our troops.

The campaign of General Cameron in the Waikato country, which is comparatively open, and in the central portion of the island, had been most successful, and peace consolidated by the establishment of posts in the confiscated territory, which was entirely evacuated by the enemy.

Description of the Country.

On the West coast, however, in the districts of Wanganui and Taranaki, the natives, although driven out of the narrow belt of open country, would not submit, but retreating to their strongholds amid dense forests, issued from them in small bodies, laying ambuscades, and cutting off stragglers up to our very posts. These people, high spirited and brave, were noted to be the least civilized of the Maori tribes, and very recently having embraced the Hau-Hau superstitions, had become desperate fanatics, retrograding into their old savage habits, and a few, it is said, even indulging in cannibal practices.

Between their fastnesses and the sea intervened a tract of open but rugged land, varying from five to seven miles in breadth, destitute of roads. On the sea-coast there was a chain of military posts about 12 miles apart.

Object of the Campaign.

With the view of reducing these tribes by penetrating into their forest recesses, hitherto considered as inaccessible to any force, a small moveable column, specially adapted for this difficult service, was organised by Major-General Chute. The strength of the column was 618, as detailed in the margin, of which one half consisted of Imperial troops, and the other of colonial. Of the latter, 46 only were Europeans, called forest rangers, and the remainder were Maories.

	Officers.	Men.
Royal Artillery.	1	32
2nd Battalion 14th Regiment.	8	265
Forest Rangers.	2	44
Native Contingent and Volunteers..	12	254
Total	23	595

These friendly natives came from villages on the Wanganui River, and were of two classes, one formed a contingent receiving pay under British and native officers, while the others were volunteers for this service, called Rupapas, and led by their own chiefs; several of their wives accompanied them fighting by their sides. The employment of these loyal natives was a new feature, and contributed much to the rapid success of the expedition, from their experience of Maori tactics, and partial knowledge of the country. They often acted independently, and were allowed to fight their own way. The best feeling prevailed between them and the regular troops.

There were two medical officers attached to the force in addition to myself. The native contingent had their own medical officer.

Medical Arrangements at Posts.

Before detailing the medical arrangements for the field, it is necessary to mention that at the posts on the sea-coast were medical officers were stationed there were small field hospitals, consisting of a hut, marquee, or merely circular

tents. The purveyor carried out my instructions well in supplying them with some additional equipment, and medical comforts.

The field hospitals at Waitotara and Patea were extended in accommodation, as they were nearest to the scene of operations, and would have to receive the sick and wounded directly from the column, which from its uncertain movements could not be embarrassed with them. The general hospital in the town of Wanganui was ready to receive some of the wounded from the small field hospitals in front.

Medical Arrangements for the Field.

The hospital establishment of the column was simple and proportioned to the scanty transport allowed, which consisted of two light drays and two pack-horses. The former carried bedding for 20 patients, as blankets, waterproof sheets, bed slips, and bolsters, which could be filled with fresh fern; also canteens A and B, and a reserve supply of medicines and surgical materials. In place of hospital marquees four circular tents and five tentes d'abri were taken, as being more manageable and suitable for this service. One pack-horse bore the panniers, and the other medical comfort boxes of No. 2 pattern.

The hospital attendants were five, including the purveyor's branch; each of the two orderlies carried a field companion. Two light one-horse ambulances accompanied the transport train, and from the nature of the country could seldom be detached. A reserve supply of hospital bearers was placed in them, besides those carried by the men. Bearers only were employed in the bush, where the men had to proceed in single file along narrow native tracks, and even they were almost impracticable in traversing steep wooded ravines.

The natives would not carry bearers, but extemporised litters from branches of trees. Their medical officer carried what was requisite on a pack-horse.

Transport.

The transport of the column consisted of 45 light drays, and a number of pack-horses under the charge of men of the Commissariat Transport Corps. These drays carried provisions and tents, &c. Sometimes pack-horses alone accompanied the column, when the men had to bivouac in the open air.

Rations.

The rations during the expedition were 1 lb. of fresh meat, 1 lb. of biscuit, and a grocery ration of $\frac{1}{8}$ oz. coffee, $\frac{1}{8}$ oz. tea, 2 oz. sugar, $\frac{1}{2}$ oz. of salt, $\frac{1}{16}$ oz. pepper. Occasionally from necessity salt pork was issued. Each man had also a daily allowance of one gill of rum.

Potatoes were generally procured in abundance from the cultivations of the enemy, and when not to be obtained, the men gathered the wild Maori cabbage, cress, and the leaves of the sow thistle (*sonchus ol.*), which last makes a palatable kind of spinage.

Clothing.

The soldiers carried a swag, formed of a blanket, great coat, and waterproof sheet (for the ground). Their dress was a blue serge tunic and trowsers with white cap covers.

Movements of Field Force.

A portion of the moveable column started on the 30th December, 1865, from the town of Wanganui, and marching northward, reached next day, Weweroa Redoubt, where it was fully completed by a large detachment of the 2nd Battalion 14th Regiment, under Lieutenant-Colonel Trevor, the Forest Rangers under Major Von Tempsky, and the native auxilliaries under Major M'Donell, and their own chiefs. There was a halt of two days, at the solicitation of our natives, who were occupied in preparing a peculiarly compressed food, made of potatoes and rotten maize, which they use in war.

On 3rd January, 1866, crossing the Waitotara River near its mouth, the field force proceeded inland to the skirts of the extensive forests, where the enemy's strongholds were concealed. Our natives in advance came upon a village, which after some resistance was destroyed.

Attack upon the Pah of Okotuku.

Next day half of the column penetrating the bush by a track leading to the Pah of Okotuku, attacked it, and the men of the 2nd Battalion, 14th Regiment, by a rush drove out the enemy, who fled down its precipitous sides. In this affair Lieutenant Keogh and four men of that corps were wounded.

On the 5th the troops were occupied in destroying the cultivations in the forests and collecting potatoes for themselves. The wounded were sent to Waitotara, the nearest redoubt on the sea-coast, where a special hospital had been prepared.

On the 6th the force marched to the Wenakuva River, and being joined by small detachments of the 2nd Battalion 18th and 50th Regiments from Patea, encamped within two miles of the Pah at Putahi, which displayed a red flag of

defiance on a lofty pole, held sacred by the fanatic Hau-Haus, and round which they dance as a religious ceremony. This strong Pah was situated in a clearing on the top of a hill, arising abruptly from a river nearly on all sides, and covered with bush. As the only approach to it in front was lined with stockades, it was deemed proper to attack it by a circuitous path in the rear, where we were not expected.

Attack upon Pah of Putalu.

Next morning at 2·30 A.M. the column marched in single file for four hours up and down dense forest and precipitous ravines, where now and then the track was lost, causing much delay and some anxiety. A desultory fire was kept up on the men emerging one by one from the last ravine, and while lying down, before the column could form for the attack. The men of the 14th Regiment charged at 80 yards under a heavy fire, and with a rush gallantly carried the position, to the astonishment of our native allies, who followed them. In such cases their system is to wait long, watching for opportunities.

Our casualties were one killed and seven wounded. All engaged were thanked in a general order, and "also the Deputy Inspector-General of Hospitals and Staff for their zeal, energy, and attention on this occasion."

Next day (8th) the wounded were escorted to the Field Hospital at Patea by the detachment, which returned. The native contingent were employed all day in destroying villages and cultivations.

On the 9th, the force, starting at four A.M., moved to the sea-coast, crossing the mouths of the Wenakura and Patea Rivers, the latter by boats, and encamped at Kakaramea, where two Armstrong guns arrived. All next day the natives were reconnoitring the surrounding country.

On the 11th, passing through Manawapon Redoubt, the encampment was at Tangahoe, where further reconnoissances required to be made, as the Pahs and fortified villages being in the deepest recesses of the forest were imperfectly known even to the few loyal natives in the vicinity.

On detachments of the 57th Regiment, from the adjacent posts of Manawapon and Waingongoro, joining on the 12th, a move inland was again made, and the camp formed on the edge of the extensive forests covering the interior of the country.

Attack upon the Pah of Otapawa.

Jan. 13.—Before daylight a column moved from camp to attack a formidable pah, called Otapawa, whose exact site was unknown. After a long march through bush and broken country, we came upon the position, which was strongly palisaded on the narrow spur of a wooden hill, and in front there was a cleared space of 250 yards which the column had to traverse. The enemy kept perfectly quiet till our men were within 40 yards, when they opened a well-directed fire from the entrenchment, and from trees on the right. The men of the 57th Regiment, under Lieutenant-Colonels Butler and Hassard, advancing through the cross-fire, entered the works, and with the 14th on the other flank, drove out the enemy, who fought desperately for a few minutes, but escaped as usual down a precipitous wooded ravine in the rear.

The pah was constructed of strong palisades, between deep ditches, having underground communications between the front and flanks. Several of the enemy were killed in the trenches. Our casualties were seven killed and 14 wounded, of whom three, mortally injured, died a few hours afterwards. Lieutenant-Colonel Hassard, shot through the lungs, lived only two days. 16 of these casualties occurred to men of the 57th. The killed could not be buried on the spot, as their bodies would have been mutilated, and heads paraded over the country as trophies. We had, therefore, to carry the dead and wounded on bearers for some miles till an ambulance met us on the skirt of the forest.

This was a trying day for all engaged, especially for the Medical Officers, who marching on foot all day with the men, and sharing their dangers, on their return to camp, jaded and weary, had to enter upon their most important duties, of carefully dressing the wounded, and performing operations. So exhausting was the day's work that, although the enemy fired into the camp at midnight, and all were roused up, strange to say, we slept soundly through it.

Next day, the wounded were sent to the small hospital at Manawapon, under the care of Staff Assistant-Surgeon Wallace, some of them to be transferred to the larger one at Patea.

Early on the morning of the 15th January, a large column, with two guns, left camp to attack Ketemarai, a strong position, where much resistance was

expected, but it was found to be evacuated by the Hau-Haus, who were now thoroughly dispirited, and had given up all hope of supernatural aid, upon which they had confidently relied. Ketemarai consisted of four palisaded pahs close to each other, in a large clearing in the forest, which were destroyed.

The regulars returned to camp early, loaded with potatoes and pigs, of which there was a grand battue, roaming as they were near the pahs in a half wild state. The native contingent remained behind to scour the bush, when, after shooting several of the enemy, they returned with much booty in the shape of horses and cattle.

Preparations for the March through the Forest.

Jan. 16.—The position of the rebels in this district having been now destroyed, and themselves dispersed, the field force rested to-day, making preparations to proceed to-morrow by forced marches to New Plymouth. Between that place and our camp towered a superb mountain, called Mount Egmont, 8,270 feet high, of volcanic origin, with its conical-cratered summit covered with snow. It stands isolated, and with a form singularly graceful, above the surrounding forests which clothe its lower slopes.

There is a narrow belt of open country between this mountain and the sea, which had once been traversed by troops meeting half-way on the coast between Patea and New Plymouth.

General Chute now determined on the bold step of crossing the interior by the bush track behind Mount Egmont, a course never undertaken by any force, as it was through a primeval forest of nearly 60 miles, without cultivations or inhabitants. Little was known about it, being closed to Europeans, and jealously guarded by the hostile tribes, to keep up secret communications with each other. The only positive information was "that the journey was usually performed by the natives in two days, but would take troops three." The result shows how erroneous this calculation turned out.

Tents and superfluous baggage were left behind with the drays in camp, which was to be moved in a few days after our departure to Waingongoro Redoubt, to wait there for our return from New Plymouth by the sea-coast. Pack-horses (167) alone were to accompany the column with three days' provisions; each soldier to carry his swag. One tente d'abri between two officers was allowed, and the baggage was reduced to the smallest possible scale.

The hospital equipment selected to be carried on six pack-horses, (as the road was reported to be tolerably good), consisted of the articles named in the margin. One horse carried a pair of panniers, and another medical comfort boxes filled according to regulation.

The force, which is to start to-morrow on this special expedition, was reduced to 425 of all ranks, as detailed below.

FIELD HOSPITAL EQUIPAGE.

1 Circular Tent.
7 Tentes d'Abri.
10 Bed Slips.
10 Bolster Slips.
10 Blankets.
10 Waterproof Sheets.
With a few Cooking Utensils from Canteens.

	Officers.	Men.
Royal Artillery	1	37
2nd Battalion 14th Regiment ..	6	250
Forest Rangers.	2	59
Native Contingent	1	69
Total	10	415

March through the Forest.

Jan. 17.—The moveable column, with packhorses, entering the forest from Ketemaria Pah, proceeded in single file along a native track, wide for a mile, leading to some occupied huts on its skirts, after which it narrowed from the overgrowth of the underwood, through which the way had to be cut.

Our natives forming the advance guard shot three Maories coming towards them quite unconscious of the presence of the field force, as it was not believed that this journey would be attempted by any body of men.

The obstructions along the path occurring at every step, the Artillerymen were sent forward as pioneers. After a march of scarcely nine miles, in ten hours, the men bivouacked for the night.

Jan. 18.—The force moved soon after daylight, meeting with fresh difficulties to the passage of the pack-horses; the path was constantly crossed by the tough stems of a climbing shrub (*rhipogonum scandens*), forming interwoven wiry masses, which entangled men and horses. Fallen trees of immense size lay across the track, requiring sometimes to be actually scooped out to enable the horses to pass over. Steep gullies and swampy places became more numerous.

The river Patea, near its source, was crossed, and the camp formed on its banks amid forest trees and dense underwood, which had to be cleared for the men to lie down.

Seven and a-half miles had been traversed during the ten hours' march.

Jan. 19.—From the exhausted condition of the horses, the start was not made till 7 A.M. Besides the natives, always in advance, looking out, and clearing the path, the Forest Rangers, and strong working parties of soldiers, alternately were incessantly employed in felling fern trees, found to be the best material to bridge over swampy places, which greatly impeded the progress of the horses. Only six miles had been passed when the evening halt was made. Several of the pack-horses did not reach camp till 10 P.M., leaving their loads behind, among which were the panniers and medical comfort boxes.

Jan. 20.—A party starting at daylight with horses brought back the abandoned loads.

The column moved at 7 A.M., encountering a succession of obstacles from streams, steep gullies, and swamps, which were very trying for the poor exhausted horses, who had no corn nor grass, but greedily devoured the leaves of certain shrubs, their only food. It was wonderful to see their instinctive readiness and boldness in descending the narrow, steep gullies, and ascending their opposite banks cut out in rude steps by the men.

Our guides now appeared puzzled, for the track at times was barely perceptible, but declared that the end of the forest was about nine miles distant. The general impression was that a wrong course had been taken, for seldom sun or sky had been visible, from the dense screen of lofty trees. An officer and an artilleryman climbing one of these about 130 feet high, reported nothing was to be seen but forest on all sides, and Mount Egmont, close to the left, with its sides furrowed by ravines crossing the path now traversed.

The troops to-day were on half rations, and there would be none to-morrow. In this dilemma, Captain Leach, Deputy Assistant Quartermaster-General, volunteered with Deputy Assistant Commissary-General Price and Ensign McDonnell, with 10 natives, to press forward to ascertain our position, and procure supplies.

Towards afternoon, the gloom of the forest deepened, and rain began to fall. During the day, 22 gullies and seven streams were crossed.

Jan. 21.—Amid a drenching rain, which had not ceased all night, the column moved at 7 A.M., with the pack-horses more in front, as they formed the chief embarrassment to our progress. Stronger working parties were in advance labouring incessantly, as our natives had left, anxious to get out of the bush, as they had no food. The soldiers worked cheerfully under the able supervision of the Deputy Quartermaster-General and other officers in cutting trees to bridge over the places flooded with rain, and in repairing gullies now too slippery to ride over, as the horses were upsetting loads and injuring themselves.

Halted at 4 P.M., for the night.

All provisions being quite exhausted, and no supplies forwarded by the party who left yesterday, there was no alternative but to kill a horse for the troops. Two pounds were issued as a ration to each person, and an hour after the meal was made of steaks of horse flesh, which was found to be very palatable to hungry men. It could hardly be distinguished from beef, though somewhat sweeter. Some of the men and officers had a repugnance to this food, to remove which the Medical Officers and hospital attendants, for the sake

of example, at once partook of it, although the former had at the time other articles.

Some of the knocked-up horses did not arrive in camp till 9 P.M., having left their loads behind. Four rivers and 13 gullies were crossed this day, but the advance was not more than 3½ miles.

Jan. 22.—The force halted to-day to recruit the jaded and half-starved horses, now several days without any food but leaves. The panniers were recovered, but as several mishaps had occurred to them, besides being now twice abandoned for the night, it was deemed necessary to save their important materials, and burn the cases, which were too wide and bulky for the narrow entangled path. The rain continued, and matters began to look gloomy, as we did not know how much longer the troops would have to struggle through this quagmire of mud, before emerging from the apparently interminable forest, where they had been for six days.

Another horse was shot this morning for rations.

As a substitute for vegetables, the men extracted succulent pith from the stem of the fern tree (*cyathea medullaris*), considered the best kind of food the New Zealand forests afford, being palatable and nutritious. They also boiled the leaves of the young fern trees. I recommended them to eat the juicy blue berries of the fuchsia tree (*fuchsia excorticata*), growing in profusion, and the only edible kind of fruit to be seen.

In the afternoon to the relief of all, Ensign McDonell returned, reporting that supplies were at hand, and 22 miles more had to be traversed before emerging from the bush, and reaching a redoubt called Mataitawa, occupied by a few military settlers.

In the evening a party of 68th soldiers brought us on pack-horses, biscuit, and groceries, sufficient for half a ration to all.

Jan. 23.—The column started at 7 A.M. in heavy rain, after another breakfast of horseflesh, encountering the same series of difficulties, but the road more impassable, from three days' continuous rain. Another party of soldiers joined with a further supply of biscuit, which was served out to each person defiling past in single file.

On reaching the halting-place the sight of two bullocks was gratifying, and the men had now abundance of the regulation food, which was decidedly preferable to the other, especially as the equine steaks did not pass through the skilful hands of a French cook.

Three streams and twenty-one gullies were crossed, and only six miles traversed.

Jan. 24.—Rained all night; the march was resumed in the morning over numerous gullies, which being very deep and slippery, and utterly impracticable for the ascent of the horses, necessitated the construction of regular steps being cut, and fixed with wood. Only five miles were passed over from the delay thus caused.

Supplies of rum and mutton arrived, along with corn for the horses, who had been living on leaves for a week. The sound of the feeding bugle, so long silent, caused an extraordinary commotion among them.

Staff-Surgeon Bawtree forwarded a few medical comforts, as rumour gave out that the force was in great distress; but they were not required, as our own supply had scarcely been touched.

Jan. 25.—A march of five miles brought the column out of the forest, the gloom and closeness of which were gladly exchanged for the fresh air and bright sun, which dazzled the eyes for some time after. There was a short halt at Mataitawa Redoubt, where the men dried their clothes and blankets, soaked by four days' rain. A hospital marquee was found to be pitched by Dr. Bawtree to receive our sick, but there were none to transfer.

Health of the Troops during the March.

The health of the troops, exposed for nine days to such a combination of unfavourable influences, was unusually good, and perhaps unprecedented under the circumstances. No casualty occurred from disease or accident. Only three men reported themselves sick—one from rheumatism, and two from slight injuries—and none required to be carried on a bearer, but one was put on horseback, although he declared he could march.

The cheerful gallant spirit of the men and officers, and their patient endurance of no ordinary hardships and privations, were admirable.

I cannot help mentioning how indefatigable the Major-General was in personally attending to the wants and interests of the men during this most trying march, which was unprecedented, even in New Zealand warfare, harassing as it always has been to the troops.

At noon the force marched to Waiwakaiho (two and a half miles from New Plymouth), where a comfortable camp had been pitched by the military authorities from that place.

Jan. 26.—The men rested in camp, enjoying a bright sunny day to dry their clothes, and were supplied with boots and other necessary equipment.

Further medical arrangements were made for a supply of hospital equipment, &c., and an ambulance from New Plymouth to accompany our column to-morrow, as field operations were to be undertaken in front of Mount Egmont, on our return to Wanganui along the coast.

Jan. 27.—The field force proceeded through the town of New Plymouth, and under a triumphal arch erected by the people in honour of the General and troops for their successful march, which would have a great moral effect among the natives generally, proving that the British soldier could penetrate into the deepest recesses of their haunts and strongholds.

The halt for the night was at Oakurua, eight miles beyond, and on the sea-coast.

From January 28 to 30 the troops made daily marches of 16 miles, halting for the night at the redoubts called Stoney River and Warea.

On the 31st they rested all day, to enable the native contingent to reconnoitre pahs reported to be in the adjacent forest, in front of Mount Egmont.

Attack upon Waikoko.

Feb. 1.—A column of 500 men left camp before daylight, to attack one of these, called Waikoko; and after marching in single file for six miles through dense bush, a clearing was reached with a village (not fortified) at the other end. The enemy, quite surprised at their meals, fled precipitately. Our casualties were one killed (soldier, 2nd Battalion 14th Regiment) and three wounded, of whom two were natives.

Next day the force pushed on to Opunaki Redoubt (20 miles), where, along with others, Te Ua, the Maori prophet, who originated the Hau-Hau religion, was made prisoner.

There being no more pahs or fortified villages in this part, and the road to be traversed only practicable for pack-horses, the drays with tents, &c., were ordered to return to-morrow to New Plymouth. Staff-Surgeon Bawtree was instructed to take back the wounded in the ambulance, and the Purveyor the hospital equipment he had brought.

Feb. 3.—The river Peo was reached after a march of 20 miles, and next day, of nearly the same distance, Waingongoro Redoubt, where were waiting the drays left behind last month with baggage and tents. During that time the adjacent country had been scoured, and some skirmishes taken place, with a few casualties.

Feb. 5.—The force marched to Manawapou Redoubt, from which a patrol was sent to attack a fortified place, but the enemy had retreated.

Next day Patea was reached, which is the chief port on the sea-coast.

On the 7th halted for the night at Waitotara, where next morning the detachment of the 2nd Battalion 14th Regiment left the column for their head-quarters at Weweroa.

Return to Wanganui. Field Force broken up.

Feb. 9.—The field force, arriving at Wanganui, was broken up. All were thanked for their exertions and services in a General Order, and the several departments, including the Medical, were especially mentioned, "for the zeal, energy, and efficiency with which they had been conducted during the recent trying and most harassing campaign."

General Health of the Troops, and their Diseases.

During this rapid campaign the troops marched more than 400 miles through a wild, rugged country, and in the middle of the hot season. The health of the men was singularly good, which may be ascribed not only to the genial climate, but to the very early morning marches, incessant movement through a new country, mental excitement, and confidence in themselves and leader, from their successful assaults on every occasion. Not a single casualty from disease occurred in the field force.

The total admissions for disease and accidents among the European portion of the force were 15, of which 8 were of the miasmatic class, viz., 1 of fever,

3 of ophthalmia, 2 of diarrhœa, and 2 of rheumatism. There was a marked exemption from dysentery and diarrhœa, generally prevalent in the hot season.

The admissions among the native contingent were 19, of which 14 were of the miasmatic form, viz., 5 of diarrhœa, 5 of dysentery, 2 of rheumatism, and 2 of furunculus. The remainder were local complaints of no importance.

In the above Report, the Medical occurrences bear an unusually small proportion to the field movements described; but this was necessitated by the extraordinary health of the troops offering no opportunities of dilating upon professional subjects, and in this respect, perhaps, a matter for congratulation; while the detailed progress of the force in rapid and constant movement, under a variety of circumstances, occasionally of a novel character, over a wild country, had a special interest of its own, irrespective of its bearing on, and reflex connection with, military efficiency and sanitary arrangements.

Wounds received in Battle or otherwise.

Gunshot Wounds.—In the *supplementary* Returns, now appended, are described the injuries received by the men and officers of the regular, and some of the irregular, forces in New Zealand during 1866 (including the campaign), and up to 31st March, 1867. Nearly all the wounds detailed were received during the above campaign, or in connection with it. A few occurred at Tauranga among the Colonial forces, during the quarter ending 31st March, 1867. The casualties of the irregular or Colonial forces, while associated with the regular troops, are alone recorded, for no information could be procured regarding those occurring at local outbreaks at distant places. The majority of the irregulars were composed of Maories.

Wounds from the accidental discharge of firearms are here included, but there are only two from this source.

The wounded were primarily received into a field hospital consisting of a few circular tents, which were preferred to marquees, under the special circumstances formerly mentioned. In a day or two they were moved to the nearest redoubt, and treated in a marquee or hospital hut, where they generally remained. Some cases were, from limited accommodation, forwarded to a small general hospital at Wanganui, or ultimately to Auckland for invaliding.

Having abundance of fresh air under canvas and in huts, the wounded, in most instances, made a rapid recovery. None were attacked with erysipelas. One case of pyæmia occurred, three weeks after a primary amputation of the thigh, and it was treated in a hut.

The hospital field equipment was simple but efficient for all practical purposes, as specially mentioned by the Field Surgeon, Mr. Manley, who had much experience in this subject, and made a very favourable representation of the arrangements under this head.

In these supplementary returns the admissions for all gun-shot wounds were 59 non-commissioned officers and men, and eight officers.

The following Table made according to the arrangement of my predecessor, gives a comparative view of wounds with their result between the men and the officers :—

Non-Commissioned Officers and Men.					Officers.				
Number of Admissions into Hospital.	Died.	Discharged.		Proportion of Deaths to Cases treated per cent.	Number of Admissions into Hospital.	Died.	Discharged.		Proportion of Deaths to Cases treated per cent.
		Duty.	Invalided.				Duty.	Invalided.	
59	9	40*	8	15·36	8	1	7	..	12·5

* Two results undetermined.

Of the above six received more than one wound. None were admitted suffering from wounds inflicted by the tomahawk, but some of the killed had injuries from this weapon in addition to those from firearms.

Gun-shot Wounds of the Head.—Under this class there were only three, of which two were scalp wounds, which rapidly cicatrized. The other was fracture of the outer table of the left parietal bone, which induced partial paralysis of the left side, without loss of sensation. The subsequent history cannot be traced, as the subject (a native) returned to his home when the case was progressing favourably. In the return he remains undischarged to duty, with result undetermined.

Gun-shot Wounds of the Chest.

Description of Injury.	Number of Cases.	Discharged.		Died.	Proportion to all Cases Treated.
		Duty.	Invalided.		
Wounds of Muscles ..	2	2	..	..	10 per cent.
Wounds penetrating chest, and wounding lungs	4	..	..	4	
Total	6	2	..	4	..

Of the four cases in which the lungs were wounded all died, indicating the great mortality which attends this form of injury.

Three of the men lived only a few hours, and the other survived a few weeks, but sank under empyema. An officer who was wounded through both lungs also died in two days.

The records of all these cases show that they were very severe, and that one or both lungs were deeply traversed, giving rise to extensive hæmorrhage.

It was found that nearly one half of the men killed in the field were wounded through the chest.

Wounds of the Abdomen.—The wounds of the abdomen were seven, of which six were superficial, or muscular.

The other was a penetrating wound traversing the abdomen, and was fatal in a few hours.

Wounds of the Back.—Four were admitted under this head, of which three were wounds of the muscles, which recovered. The other was extensive fracture of the sacrum in which the bullet lodged, giving rise to partial paralysis. After lingering for eight months the soldier sank from abscesses in the pelvis and of the kidneys, evidently connected with the original injury.

Wounds of the Upper Extremities.

Description of Injury.	Number of Cases.	Discharged.		Amputations.
		Duty.	Invalided.	
Superficial wounds..	2	2	..	..
Wounds of muscles	2	2	..	..
Fracture of scapula	2	1	1	..
„ of humerus	2	2	..	..
„ of radius or ulna ..	3	1	2	..
„ of bones of hand . ..	2	..	2	..
Total	13	8	5	..

Most of these wounds recovered rapidly.

Fracture of humerus, two. These cases were both very severe from extensive shattering of the bone, but united well, showing that amputation is seldom necessary.

Wounds of the Lower Extremities

Description of Injury.	Number of Cases.	Discharged.		Died.	Amputations.
		Duty.	Invalided.		
Superficial wounds ..	3	3	..	..	..
Wounds of muscles ..	13	12	1	..	..
Fracture of bones of pelvis	1	1	..	..	..
Fracture of femur ..	1	..	1	..	..
Fracture of tibia or fibula	1	..	..	1	1
Total	19	16	2	1	1

This case of fracture of the femur, and another occurring in an officer who remained from last year, recovered favourably with useful extremities.

Wounds of Large Arteries.—The single case under this section was the femoral artery being wounded in its upper third (complicated with extensive fracture of the adjacent bone.

As this is the only instance during the New Zealand war of a man with such an injury coming under treatment, some account of the case may be presented here.

At the assault upon the Pah of Otapawa, Sergeant Fox, 2nd Battalion 14th Regiment, fell wounded about 15 yards from Assistant-Surgeon Manley, V.C., Royal Artillery, who running to him, found a gun-shot wound in the upper third of the left thigh, with much hæmorrhage from laceration of the femoral artery. The prompt pressure of his finger on the artery and application of a tourniquet, along with plugging of the wound, effectually arrested the bleeding just in time to save life, as the man was about fainting from the sudden loss of blood. I saw him a few minutes after, when he had rallied, and accompanied him, as he was carried on a bearer for five miles to camp. On examination, the femur was found to be extensively shattered, which along with the injured artery, necessitated immediate amputation under very unfavourable circumstances.

He sank an hour after from shock and loss of blood, having survived 12 hours after the receipt of the injury.

Wounds of the Joints.—There was one admission under this head, consisting of a penetrating wound of the knee-joint, along with fracture of both condyles of the femur. Primary amputation was imperative, and was performed on the field, but the case unfortunately was fatal three weeks afterwards from pyæmia.

It may be mentioned here that one of the scapular wounds of the superior extremities on examination in the field appeared to have penetrated the shoulder-joint. On putting the subject afterwards under chloroform for further exploration, and if necessary immediate excision, it was decided that the joint was not opened, although the capsule may have been injured by the course of the bullet. Constitutional irritation and a large abscess in the axilla supervened.

On the soldier leaving to be invalided for England, five-and-a-half months after the receipt of the injury, there was only a sinus of the size of a pin's head, leading to a small piece of dead bone. The shoulder was stiff, but movements were improving. From the history of the case, it is probable that subsequent partial sloughing of the capsule from the graze of the bullet opened the joint.

There being a difference of opinion among the surgeons, who successively attended upon this obscure case, it was not admitted under this section.

Sciatic Nerve.—There wa one case of injury to the sciatic nerve which was progressing favourably towards recovery, when the man was invalided from the colonial force.

Operations.—The operations performed were very few, for there were only five amputations and seven extractions of bullets.

Two were amputations of the fingers. Two were amputations of the thigh, which were primary and performed on the field; both died as detailed formerly,

one from pyæmia, and the other from previous loss of blood consequent on laceration of the femoral artery on the field.

The experience of the war has not been favourable to amputation of the thigh for fracture of the femur. Inspector-General Mouat reports that of six amputations, three died, which added to the two cases now recorded, make five deaths out of eight amputations. The treatment, however, of compound fracture of the femur, without recourse to amputation, has been rather successful, for out of eight cases only one died.

The single case of amputation of the leg was secondary, and was performed on a man of the Colonial forces in a Colonial hospital. The case terminated fatally from exhaustion ten weeks after the receipt of the wound, as reported by the surgeon.

Chloroform was invariably administered in all operations and explorations.

Tetanus.—None of the wounds were complicated with tetanus. The only instance of its occurrence during the period embraced in this return was in a soldier's wife, while under treatment for ulcers of the leg, in the female hospital at Auckland, which ended fatally on the fifth day.

The treatment of simple flesh wounds by closing up the orifices and approximating the incised edges by sound skin, as recommended by the American surgeon, Dr. Chisholm, was not adopted, as it had been tried without success in the former period of the war.

These supplementary returns with report furnish materials and surgical data too scanty to be of any value in themselves, from the very limited number of cases recorded in them.

Superadded, however, to the classified returns included in the elaborate report of the surgical history of the previous part of this war by Inspector-General Mouat, they may perhaps be accepted as a small contribution informing general conclusions on some points.

Classified Returns.

I.—Officers Wounded (Gun-shot) in Action in New Zealand, remaining under Treatment, 31st December, 1865.

Number.	Classification.	Region of Body Wounded.	Number of Cases.	Invalided to England.
9	Wounds of Lower Extremities ..	Fracturing femur	1	1
		,, ,, tibia and fibula	1	1
		Fracture of bones of foot..	1	1

II.—Officers—Return of Gun-shot Wounds and Injuries received during the War in New Zealand from 1st January, 1866, to 31st March, 1867.

Number.	Classification.	Region of Body Wounded.	Number of Cases.	Died.	Discharged to duty.	Invalided to England.
4	Wounds of chest	Penetrating and wounding lung	1	1	..	..
6	,, of back	Muscles of back	2	..	2	..
8	,, of upper extremities	Wounds of muscles	1	..	1	..
9	,, of lower extremities	,, ,, ...	3	..	3	..
		Fracture of pelvis	1	..	..	1*

* Colonial Officer, remaining under treatment.

II.—Non-Commissioned Officers and Men.

Classified Return of Gun-shot Wounds and Injuries received during the War in New Zealand, from 1st January, 1866, to 31st March, 1867.

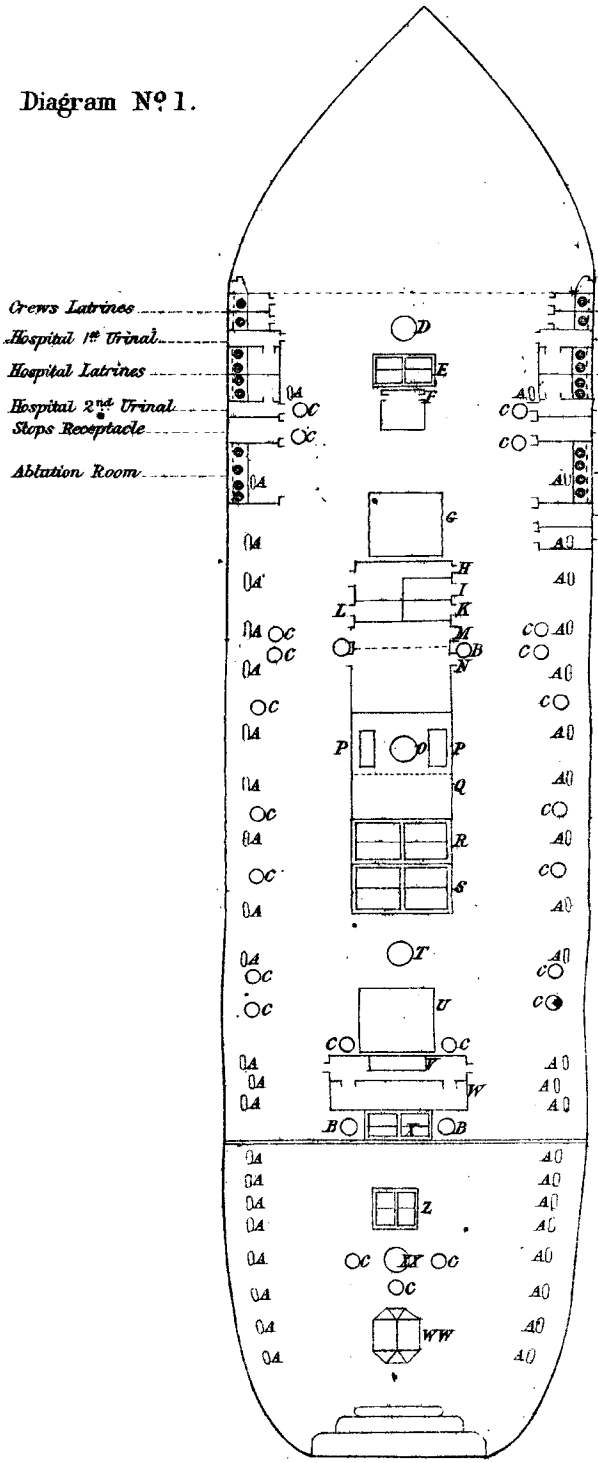
Classification.	Region of Body Wounded.	Number of Cases.	Amputations.		Other Operations.	Died.	Discharged to Duty.	Transferred to		Remaining.
			Primary.	Secondary.	Bullet Extracted.			Their own Home in the Colony.	England.	
All wounds and injuries ..	.. ..	59	4	1	7	9	40	2	8	..
1. Wounds of the head	Wounds of the Scalp only	2	..	..	..	..	2	..	..	..
	Injuries of the Cranial Bone	1	..	..	..	..	..	1	..	Unknown
2. Wounds of the face ..	Fracture of the bones of the face	2	..	..	..	..	1	..	1	..
3. Wounds of the neck ..	Wound of the muscles of the neck	1	..	..	..	..	1	..	..	..
4. Wounds of the chest	Wounds of the muscles of the chest	2	..	..	..	..	2	..	..	..
	Wounds penetrating and wounding lungs	4	..	..	1	4	..	..	..	..
5. Wounds of the abdomen	Wounds of the muscles of the abdomen	6	..	..	..	..	6	..	..	..
	Wounds injuring abdominal viscera	1	..	..	..	1	..	..	..	..
6. Wounds of the back and spine ..	Wounds of the muscles of the back	3	..	..	1	..	3	..	..	..
	Fracture and injuries of spinal column and sacrum	1	..	..	..	1	..	..	..	..
7. Wounds of the perinæum and genital and urinary organs	Wounds of the perinæum, genital and urinary organs ..	1	..	..	..	..	1	..	..	..
8. Wounds of upper extremities ..	Superficial wounds	2	..	..	..	..	2	..	..	..
	Wounds of the muscles	2	..	..	1	..	2	..	..	..
	Fractures of bones (complete)	..	..	..	..	..	..	..	..	..
	,, Scapula	2	..	..	..	..	1	..	1	..
	,, Humerus	2	..	..	..	..	2	..	..	..
	,, Radius or Ulna	3	..	..	1	..	1	..	2	..
	,, Bones of the hand	2	2	..	..	..	..	..	2	..

Classified Return of Gun-shot Wounds, &c.—*continued.*

Classification.	Region of Body Wounded.	Number of Cases.	Amputations.		Other Operations.	Died.	Discharged to Duty.	Tranferred to		Remaining.
			Primary.	Secondary.	Bullet Extracted.			Their own Home in the Colony.	England.	
9. Wounds of of lower extremities	Superficial wounds	3	..	..	..	..	3	..	..	..
	Wounds of the muscles	13	..	..	1	..	12	..	1	..
	Fractures of bones (complete)	..	..	..	..	..	..	..	..	..
	„ bones of pelvis	1	..	..	1	..	1	..	..	..
	„ femur	1	..	..	1	..	..	..	1	..
	„ tibia or fibula	1	..	1	..	1	..	..	..	..
10A. Wounds of large arteries	Femoral artery (with fracture of femur)	1	1	..	..	1	..	..	..	..
11. Wounds with direct penetration or perforation of large joints	Knee joint (with fracture of femur)	1	1	..	..	1	..	..	..	..
12. Wounds with direct injury of large nerves	Sciatic nerve	1	..	..	..	..	..	1	..	..

Diagram Nº 1.

UPPER DECK



A Elliptoid Trap Ventilators
B Dr Edmonds's main Ventilating Tubes.
C Circular Ventilating Tubes from main, lower and orlop deck.
D Fore mast
E Skylight
F Ships Galley
G Foremain Hatchway
H Laundry
I Ships Butcher
K Purveyor's Butcher
L Bake House
M Hospital Galley
N Saloon Galley
O Large Funnel
P Water Tanks for Baths &c.
Q Grating over Engine Room.
R Skylight over Engine Room.
S Dº Dº Surgery
T Main Mast
U Main Hatchway
V Companion
W Captains Cabin
X Skylight
Z Skylight
XX Mizen Mast
WW Skylight

APPENDIX No. LIV.

ABYSSINIAN EXPEDITION.

Descriptive and Sanitary Report of the Hospital Ship "Queen of the South."

The "Queen of the South" was fitted in the Victoria Docks for hospital service in Abyssinia, and furnished with the various special appliances necessary. After a short delay at Greenhithe, she proceeded to Devonport, whence, having duly completed all her preparations, she sailed for Aden, *en route* to Abyssinia, on the 5th of October, 1867.

The special purpose for which the ship was designed was held in abeyance during the voyage out, and her decks occupied by military stores, &c.

Descriptive Outline of the Ship.

The "Queen of the South," unlike her sister ships "Mauritius" and "Golden Fleece," is built, the lower half as high as the floor of main deck, of iron, the upper, including the topsides, of wood; and thus it happens that the walls in the upper decks are constructed of the latter, those in the lower of the former material.

An auxiliary screw vessel, having a gross tonnage of about 2,091 tons, containing engines of 300-horse power, with a pressure of only 15 lbs. to the inch; she is about 15 years old, and a fair sailer; there are four decks, viz., 1st upper, 2nd main, 3rd lower, 4th orlop, of which two alone are designed to afford ward accommodation for the sick, the upper being devoted (a clear space, as far as possible, as a promenade for sick and convalescents) to the purpose of containing the several out-offices and dependencies required by a hospital establishment; the lowest or orlop to that of affording space for the construction of pack, issuing stores, &c., and rooms for sick officers' baggage, reserved medicines, medicine cases, &c.

The upper deck* may conveniently be divided into three portions, a first, or forecastle forwards, occupied chiefly by the crew, and with which we have nothing to do; a second, or central, intended for the use of sick and convalescents; a third, aft, or quarter-deck, assigned for officers of all denominations, including those sick and convalescent who may hereafter come under medical treatment.

The second, or central portion going from before backwards, contains the following offices or dependencies connected with the hospital, viz., on each side immediately abaft the forecastle, a block of wooden compartments, consisting of, in order, a 1st urinal; two latrines, each containing two seats, and separated by a complete partition; a 2nd urinal; a receptacle for slops and contents of Fyffe's stools when used and brought up from below, and which is fitted with three circular wooden stands for chamber utensils to be kept during the daytime; an ablution room or washing house, having four earthenware basins, taps for water laid on, afferent and efferent pipes, &c., the former (afferent) in connection with a tank situated above and behind the preceding compartment, or that for "slops;" this room also contains five circular wooden stands, or apertures in framework, for chamber utensils, which, when used below, are to be deposited here during the day, alternately in batches for exposure; and a linen store for soiled sheets, clothing, &c., on the starboard side.

Corresponding in a central line with these, and lying amidships between them, come in order the foremast, a fore skylight for the main-deck below, the

* *Vide* Diagram No. 1 appended, of a scale of 20 feet to an inch.

crew's galley, and fore main-hatchway; still further aft, and in the centre, amidships also, is a large deck-house, divided into the following compartments:—A wash-house or laundry, having a metal-lined floor and troughs, table on hinges, &c.; a bakery on port, a ship's and a purveyor's butcher's room on starboard side, a hospital bakehouse and cooking galley, and lastly the ship's saloon cooking galley.

Next comes the engine's large funnel, with two capacious metal tanks attached, one on each side, for the supply with salt-water of two bath rooms and water-closets in the deck immediately below; behind this again is a skylight, common to engine-room and surgery, the forepart of which supplies the former, the afterpart the latter; next the mainmast, then the after main hatch, captain's cabin, and entry down into saloon through after part of main deck, and lastly a skylight for the saloon below, communicating by means of a square wooden trunked air funnel with the lower deck beneath the saloon, and which contrivance shall be presently described.

The third, aft portion or quarter-deck, presents in its centre two large skylights for lighting the saloon below, the fore one communicating also with the lower deck by means of a square wooden trunked air funnel similar to the one just previously mentioned; between them is the mizen mast, and on each side of it a cowled ventilator, circular, made of metal, and emerging from lower deck through the saloon.

The entire of the upper deck has been pierced on each side, fore and aft, with elliptoid trap and circular openings for ventilating tubes, adapted for each kind, and leading up from the different decks below; but special notice had better be taken even now of four circular ones, much larger in calibre, and more remarkable than all the others; two forward, one on each side of bakehouse and hospital galley, and two aft, just behind the Captain's cabin; one on each side of the skylight, mentioned before as existing thereabouts, fitted with large galvanized iron main ventilating tubes, and capacious revolving cowls, furnished with shifting pieces, to increase their height, and a steam jet internally for the exhaustion of air, &c.; these belong exclusively to Dr. Edmonds' system of ventilation of the lower deck, and are again to be alluded to more particularly when describing that portion of the ship to which they are peculiarly connected.

The following Table gives measurements of the various out-offices and dependencies of the hospital, on port and starboard sides, which may be found useful for reference at some future period:—

TABLE No. 1.

		Port Side.	Starboard Side.
		ft. in.	ft. in.
1st Urinals ..	Height	6 1½	6 1½
	At top ..	2 10½	3 3¼
	Depth at centre ..	3 3½	3 8½
	At bottom ..	3 4½	3 11½
	Frontage	2 0½	2 0½
Two Latrines ..	Height	6 1½	6 1½
	At top ..	2 10½	3 3¼
	Depth at centre ..	3 3¼	3 8½
	At bottom ..	3 6	3 11½
	Frontage of both ..	8 6	8 4
2nd Urinals	Same as 1st	..	..
Slops Receptacle..	Height	6 1½	6 1½
	At top ..	1 4¼	1 5
	Depth at centre ..	2 9¼	2 10
	At bottom ..	3 4¾	3 11½
	Frontage	2 10½	2 10½
Ablution Rooms..	Height	6 1½	6 1½
	At top ..	3 1¼	3 3¼
	Depth at centre ..	3 3	3 8½
	At bottom ..	3 2½	3 11½
	Frontage	7 5	6 10¾
*Linen Closet on starboard side only	Height	..	6 1½
	At top ..	..	3 10½
	Depth at centre ..	..	4 4
	At bottom ..	..	4 8½
	Frontage	..	6 0

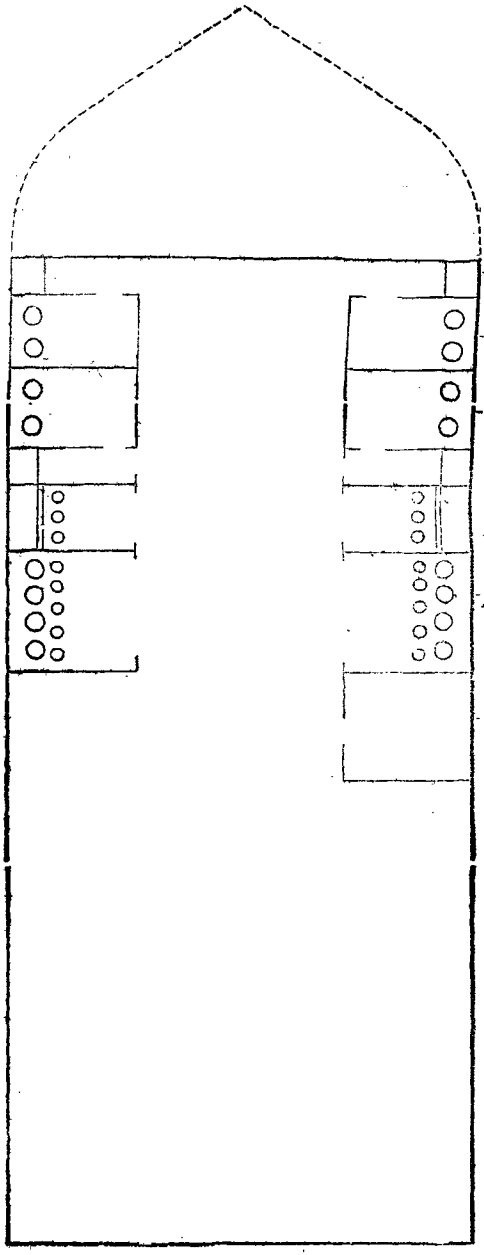
* Now divided into two equal parts, viz., linen closet and lamp room.

The following Table gives measurements of those central ones amidships viz. :—

TABLE No. 2.

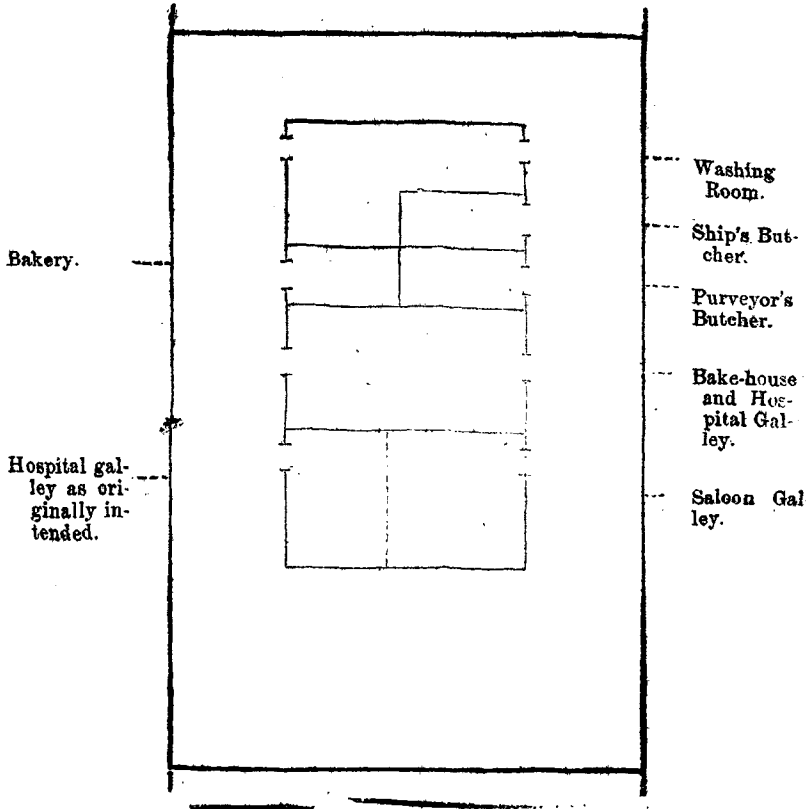
Names.	Purposes.	Measurement.	ft.	in.
Washing Room ..	Laundry ..	Height	6	4½
		Length, port side ..	6	4
		„ starboard side .	4	10
		Width across	12	0
Ship's Butcher ..	Saloon ..	Height	6	4½
		Length	3	2
		Width across	5	7
Purveyor's Butcher ..	Hospital ..	Height	6	4½
		Length	2	11½
		Width across	5	7
Baker	Saloon & Hospital	Height	6	4½
		Length	4	7½
		Width across	6	0½
Bake-house & Gallery.	Hospital ..	Height	6	4½
		Length	4	7½
		Width across	11	7½
Cooking Gallery ..	Saloon ..	Height	6	4½
		Length	8	9
		Width across	11	7½

The following rough diagram will give an idea of the mode of arrangement of the out offices contained in No. 1 Table, viz.:



The next rough diagram represents the arrangement of those offices, &c., mentioned in No. 2 Table, viz.:—

* This has since been divided into two compartments, viz., "Linen Closet" and Lamp Room," *vide* Diagram No. 1 appended



Urinals contain each a small oblong quadrilateral trough lined with zinc, which inclines or slopes downwards towards, and communicates with the larger troughs of the latrines; their frontages are open on the deck, and have no doors.

The latrines consist of four seats on each side, arranged in pairs (*i.e.*, each pair) separated by a complete partition not open at the top, each possessing a separate door of entry in the walls which divide them from the urinals, their frontages are closed on to the deck; but here near the top a deficiency exists for each, 3 feet 3 inches long by 6½ inches wide, with a small circular aperture intervening for light and ventilation. Each latrine contains two seats in a frame, moveable, furnished with hinges, which can be raised at will like the lid of a box, and the trough thoroughly flushed and sluiced out by the pump hose, disinfected, &c.

The ablution or wash-rooms, one on each side, have their frontages open on to the deck. They each contain four earthenware basins, with water on tap supplied from tanks located behind at the upper third of the back of the preceding compartment or that for slops, and which will account for the small measurements of depth "at top" and "centre" rendered in the Table as above; each tank can contain about 15 gallons of water, which, fresh or salt, can be poured in through a stopper-hole at the top.

The linen closet, on starboard side, is, as before stated, protected by a door, padlock, &c.

The washing house in Table and Diagram No. 2, is furnished with a large wooden trough lined with metal and separated into compartments, also with a table, the leaf of which fitted with hinges can be raised up or let down at pleasure; a patent mangle and washing machine have been provided, and the floor of the room is covered over with metal so as to prevent any water leaking through to the deck below; it contains windows and doors in abundance for convenience, light, and ventilation.

Two small rooms have been appropriated on the starboard side for the ship's and purveyor's butchers, and one on the port side adjoining for the baker, this is common both to the saloon and hospital; and is furnished with trough, dough-making machine (Kent's patent), dough baskets, lined with tin, and all other requisites.

The hospital bakehouse and galley contains two capacious ovens and two very serviceable and commodious cooking ranges, one larger than the other, made by Watts, of Plymouth, &c. Fresh bread can here be baked daily in large quantities, and four times a week for about 500 men if necessary.

The saloon galley is separated from the hospital galley which it closely adjoins by the two large ovens continuous with an iron railing on the starboard half; it is intended to cook for sick officers, as well as for the saloon generally.

It is necessary to allude to the hatchways and skylights in this deck before proceeding to review the special ventilating tubes, funnels, and traps which exist in it in large number, and first in order behind the foremast comes a small bivalve skylight, lighting the foremost portion of the main deck, having a moveable glazed window on each side of central prominent wooden ridge which thus divides the opening into two equal portions measuring 4 feet 7 inches in length, by 3 feet in width, thus

Next is the fore main hatchway situated immediately in front of washing house or laundry, square in form, with a capacity of 7 feet and 1 inch long, by 7 feet broad, and leading down through the intermediate to the lowest or orlop deck where are purveyor's stores, &c., communicating with each one in its course; this is fitted with the usual cross-barred grating or covering which used to be fastened down and covered by tarpaulin when the state of the weather demanded it, but the necessary materials for a proper hood having been furnished at the Cape,—the special contrivance was to be constructed at Aden or Annesley Bay.

Passing further aft and just behind the mainmast, between it and the captain's cabin, is the after main hatchway, square, likewise leading down to orlop deck where are reserved medical stores and room for sick officers' baggage, communicating with each deck in its course, and measuring 4 feet 9 inches in breadth, by 7 feet in length; it is fitted with a grating similar to that of the other main hatchway, for it also materials for a proper hood were provided at the Cape, and the special contrivance likewise to be constructed at Aden or Annesley Bay.

Abaft the captain's cabin, between it and the quarter deck, is another prominent skylight lighting the saloon underneath, having four glazed windows, two on each side of a broad central wooden ridge, in its forepart; this communicates by means of a quadrilateral trunked wooden air funnel passing through the saloon with the lower deck, the aperture or mouth of which is irregularly quadrilateral, oblong, and measures 2 feet 9 inches in breadth by 6 feet in length; the measurement of the entire skylight aperture on each side is as follows, viz., 5 feet 8 inches long by 2 feet 6½ inches broad, a deduction from which is to be made for the size of the mouth of air funnel just now mentioned.

On the quarter deck lying fore and aft are two other skylights, the mizenmast intervening between them, both lighting the saloon, the "fore one" communicating with the lower deck by means of a square wooden trunked air funnel passing through the saloon, and similar in every respect to the one before described, lights the saloon, presenting the following measurements, viz., 5 feet 4 inches across in breadth, 4 feet 1½ inches in length, but the size of the square mouth above of trunked wooden funnel, *i.e.*, 1 foot 10 inches in breadth, by 5 feet 4 inches in length, is to be deducted from the dimensions of the entire opening, the "aft one" measures in its greatest length 10 feet 4 inches, in its greatest breadth 5 feet 8 inches, and forms an eight sided elliptoid glazed covering frame above, lighting and ventilating the saloon below, as does its fellow also.

The different decks below are ventilated, each one independently, and separately from the others, but all the ventilators emerge through the openings

in the upper deck to reach the atmosphere above and without, many of them being elevated some feet so as to get beyond the reach of neighbouring obstructions, and thus obtain a clear stage for uninterrupted egress or ingress of air, and free scope for the numerous movements and shiftings of their respective cowls.

Running along the entire extent of the upper deck on each side fore and aft, are a series of substantial metal ventilating traps, elliptoid in figure, the long axis 12 inches from before backwards, the short 5½ inches from side to side, these "chimney-like" projections rise to a height of about 9 inches above the deck, are furnished with moveable tops, which, when closed, like a stopper in a bottle, seal them up completely; when withdrawn, reversed and then replaced, fit so as to project upwards to a still further extent of at least 4 inches beyond the summit of the chimney, acting as a ventilating top, and presenting four apertures in its contained sides for the access or exit of air. These tops are bound by a short chain which admits of their being moved in the different directions and distances necessary for their adjustment; by this arrangement the ventilating apertures can be completely closed in bad weather, partially closed in rainy weather, so as to admit air without rain, or left open altogether for light as well as air should occasion require a complete up or down draught.

They are 22 in number on each side, five open directly from main deck below, seven on quarter deck from cabins off the saloon, each one of which, with two exceptions, viz., that belonging to the transport officer on starboard, and the corresponding one or fellow (a spare cabin) for two sick officers on port side, has a ventilator of its own, the remaining ten open some through the main "between decks," others through cabins off the saloon, by means of quadrilateral oblong wooden trunked air shafts, the two sides of which measuring about 1 foot 1½ inches and the two ends about 8 inches, from the lower deck; these shafts in the main deck present no obstruction of any moment, but in the officers' cabins, running, as some do, right through their centre, they impede free movement to a certain extent.

Placed at intervals and interspersed, as it were, amongst those already described, other metal ventilating tubes, circular, fitted with revolving cowls, and rising to various heights, are to be found 11 in number on each side, four of which open directly from the deck underneath, commencing within 1 foot of the floor of main deck by a large quadrangular opening in an iron funnel, which soon becomes circular, five from the lower and two from the orlop deck.

The "first," and "second," (on each side) forward opposite to the first urinal and junction of slops receptacles with ablution rooms, rise to a height of 7 feet 9 inches, the diameter of the tube 1 foot, the diameter of cowl 1½ feet; these lead up from lower deck, and can, like all the others be made inlets or outlets at pleasure; the "third," in order is nearly opposite to, or on a line with hospital cooking galley, leads up from lowest or orlop deck, and rises to a height of 5 feet 2½ inches, has a moveable cowl 1½ feet in diameter, diameter of tube 1 foot; the "fourth," is opposite, or in a line with junction of hospital with saloon galley; the "fifth," opposite the end of saloon galley; the "sixth" opposite great engine funnel; the "seventh," opposite surgery skylight; and "eighth," opposite the interval between mainmast and after main hatchway, project above the upper deck to a height of about 4 feet, diameter of tubes 1 foot, diameters of moveable cowls 1½ feet; the "ninth" communicates with lowest or orlop deck, and gives the same measurements as the "third," which also leads upwards from the same place, viz., height 5 feet 2½ inches, diameter of cowl 1½ feet, diameter of tube 1 foot: it lies opposite to, or on a line with after main hatchway.

The "tenth," situated (one on each side) just at each front or fore corner of deck house, which contains captain's cabin and companion, possesses a great height, viz., that of 10 feet, diameter of cowl 1½ feet, diameter of tube, 1 foot: it is elevated above the deck-house to a height of about 3 feet.

The "eleventh," (one on each side) is placed on the quarter-deck, about its centre, by the side of the mizenmast, and at a little distance from it; it rises, the starboard one to a height of 5 feet 2 inches, the port one 4 feet 9 inches; diameters of tubes, 1 foot; diameters of cowls, 1½ feet.

Of these, the "first," "fourth," "eighth," and "eleventh," lead up from

and ventilate the lower deck; the "second," "fifth," "sixth," and "seventh," the main deck, these last being also arranged so as to commence within one foot of the floor, in the manner before-mentioned, and the "third" and "ninth" from the lowest, or orlop deck.

In addition to these is an old ventilating tube, with cowl, which emerges from lower deck, along the port fore angle of washing-house, or laundry, beyond the roof of which it projects above; diameter of cowl and tube of the same dimensions as that of the others.

Four large tubes, of Dr. Edmonds' system, also as before-mentioned, appear upon this deck, two forward, one on each side of, and closely approximating hospital galley; two aft, just behind the captain's cabin, one at each corner; these are elevated to a height of about 8 feet 9½ inches, and by means of a shifting piece, fitted with side handles, can be still further elongated to an extent of about 4 feet 2 inches more; diameter of tubes, about 1½ feet; diameter of moveable cowl, also fitted with side handles, 2 feet 7 inches; the entire length of shifting pieces is 5 feet, but as about ten inches of its length is received within the lower part of the tube, into which it is made to fit, it really increases the entire length of the ventilating tube by 4 feet 2 inches only.

These are main ventilators, and this is the most convenient place to transcribe Dr. Edmonds' system of ventilation, as it exists on board this ship.

Dr. Edmonds' System of Ventilation.

Dr. Edmonds' system of ventilation in the "Queen of the South," consists of a horizontal air-shaft, extending along each side of the lower deck, with ventilating apertures, each air-shaft is divided into two by a transverse division near its middle, making four separate shafts.

Each of these has a main ventilator connected with it, which, passing through the main deck, terminates above the upper deck in a revolving cowl, and is furnished with a "shifting-piece," to increase the height above the deck when the ship is at anchor in hot latitudes.

When there is any wind, ventilation is to be effected by turning the cowls to windward, which will force fresh air below, and diffuse it throughout the deck space, but in calms other means are provided, viz.:—

First, with the aid of steam in a minor degree, by passing a small quantity through the heating-pipes, the heat will rarify the air, and cause a moderate outflow of the foul air of the "between decks" up the main ventilator, a small tank receives the condensed water, which must be drawn off when full, and may be used for washing purposes; if not drawn off the excess will escape through the unstopped pipe on deck.

Second. When the full steam jet is turned upwards steam will escape with great velocity up the ventilator, carrying with it a large quantity of the fouler air from between decks, which is necessarily replaced by pure external air; before turning on the steam jet it is advisable to pass steam for a few minutes through the heating-pipes.

Whenever steam is used for ventilation, the cowl of the same ventilator should be turned to leeward, and the cowls of all the others to windward.

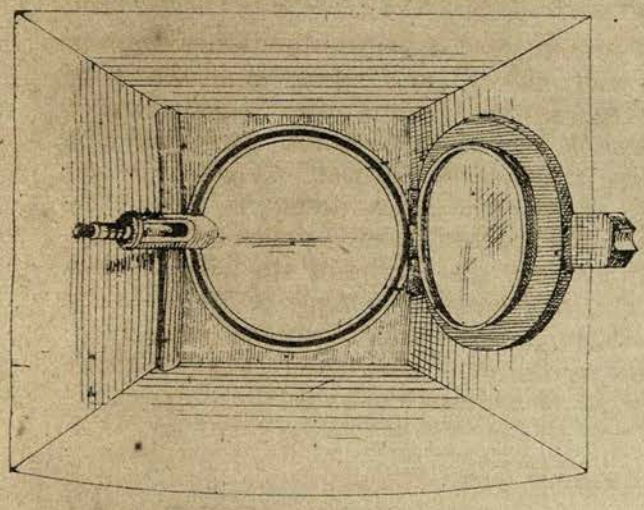
Air-propellers are furnished in addition for each ventilator; these fit into the large ventilating tubes when the cowl is removed, and are worked by a strap, the easy labour of one man will force down a large quantity of fresh air, and diffuse it through the ventilating apertures of the shaft below.

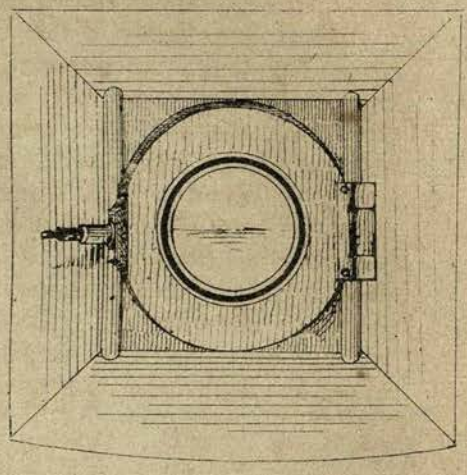
These might be used for a short time occasionally, when the atmosphere is stagnant below, particularly after meals and at night time.

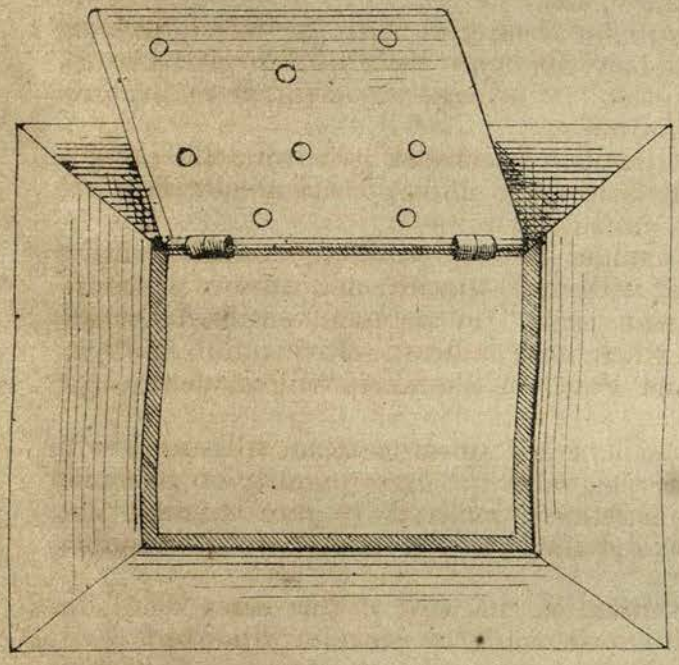
At night time particularly all hatchways or openings leading to the hold should be carefully closed, and the cowls of all the ventilators leading from it to the upper deck turned to leeward; otherwise, should fresh air be forced in, the fouler air would be dispersed into between decks through the seams in the ship's sides or other crevices.

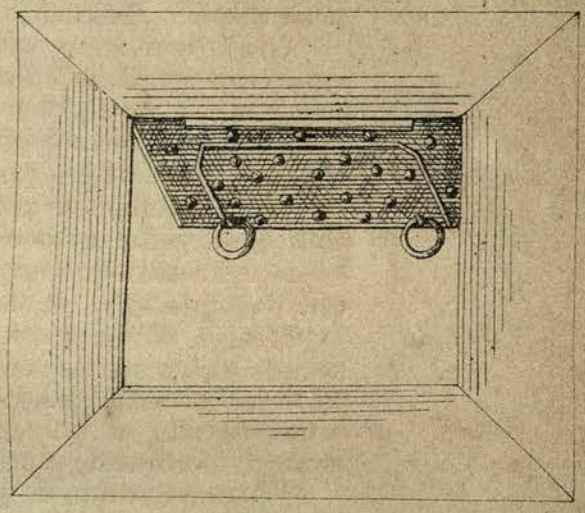
The cowls of all ventilators will either serve to force fresh air below, or exhaust it from below, according as they are turned to or from the wind; but the former action has the most powerful ventilating effect, and therefore in hot weather should be preferred; the fouler air would then be forced up the hatchways.

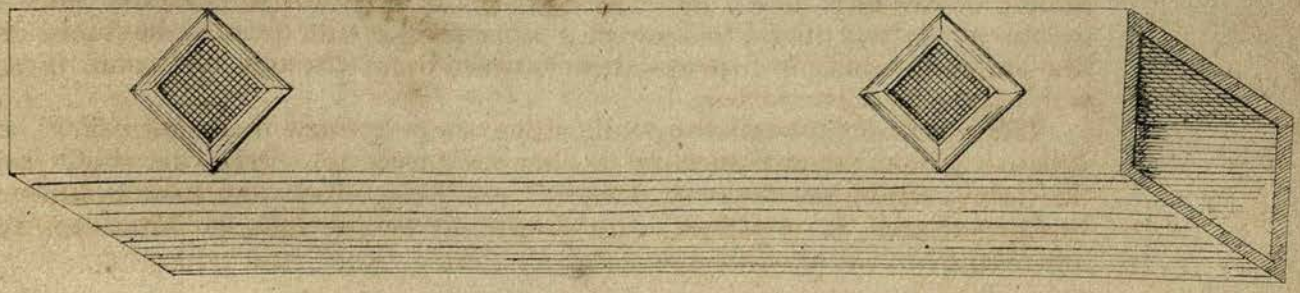
DIAGRAM OF SCUTTLES, COAL PORTS AND A PORTION OF DR EDMONDS'S HORIZONTAL AIR SHAFT OF LOWER DECK.





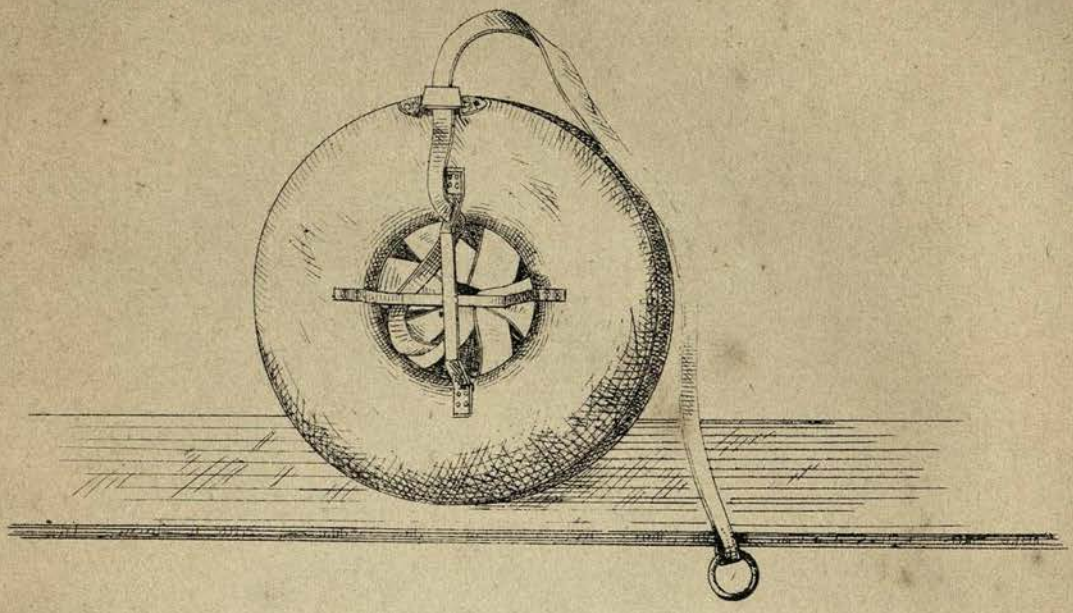






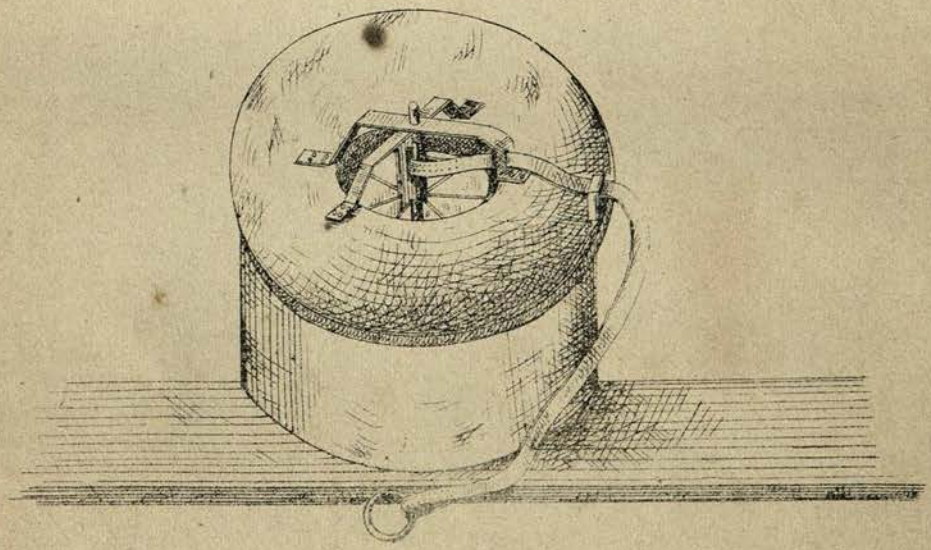
Dr EDMONDS'S AIR PROPELLER.

No. 1.



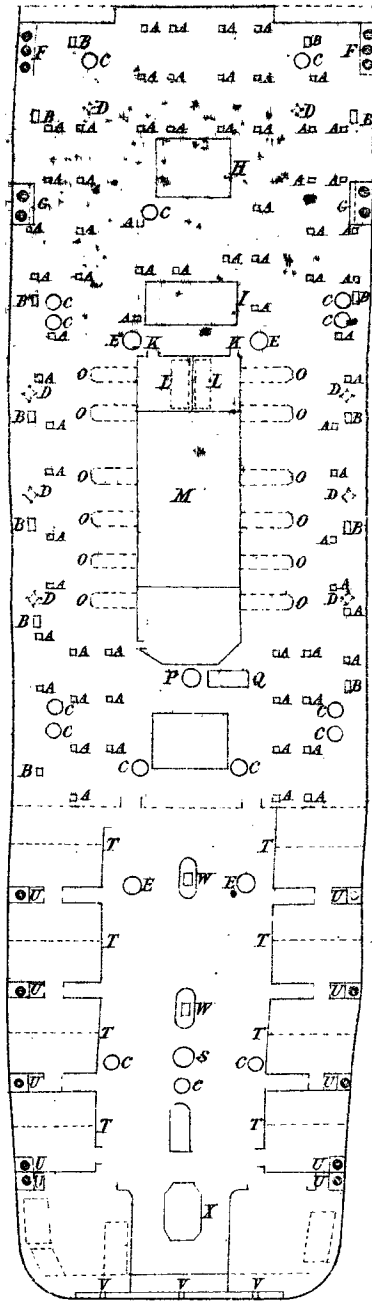
TOP VIEW.

No. 2.



SIDE VIEW.

Diagram № 2.



MAIN DECK

A Stancheons
B Square trunked air shaft going to Elliptoid Trap Ventilators
C Circular Ventilators for lower and orlop decks
D Ventilators for Main deck coming within a foot of floor
E Dr Edmunds's Ventilators
F Ablution Basins
G Water Closet
H Foremain Hatchway
I Coal-hatch
K Bathroom
L Baths
M Engine Room
N Surgery
O Tables
P Main Mast
Q Water Tank
R Main Hatchway
S Mizen Mast
T Cabins
U Water Closet
V Windows
W Skylight going to Lower deck
X Rudder & Screwshaft casing

The ventilation of the air-shafts may always be observed by holding a lighted candle to any of the wired openings in it, the flame will be drawn *in* with ventilation by exhaustion, and forced outwards if air is being propelled below, or by the direct action of the wind.

When the steam jet is used the boiler pressure should be 20 pounds to the inch to obtain the full effect, and not less than 14 pounds; owing to the distance the steam has to traverse, much is condensed in the pipes and down the sides of the ventilators; the use of air propeller is free from this inconvenience.

When the ship is lying at anchor in the tropics, the shifting-pieces belonging to the ventilators should be raised to their places, and the cowls placed over them, the cowls revolving above the awning, which should be perforated thus Spare straps are supplied for the air propellers (4), which are in charge of the chief officer.

It will now be readily understood that the lower deck is ventilated not only by Dr. Edmonds' patent system, which is exclusively devoted to it, but also by a supply of the ordinary shafts, tubes, air funnels, scuttles, &c., as well, whilst the main deck and remainder of ship depend altogether upon these latter alone for the due supply of air and purification by ventilation, &c.

The main deck* is also divided into three portions, 1st, a foremost one, and partitioned off by a bulkhead, corresponding to forecastle on the upper deck, and assigned to the crew; 2nd, a central portion, or "main deck," properly so called, extending so far aft as the saloon, and corresponding with the second, or central portion of the upper deck, before described; 3rd, the saloon, which corresponds to about the extent of the quarter deck above, on the upper deck.

This deck (with the first or foremost portion of which we have nothing to do) possesses a height between decks which varies according to the situation where it is taken; thus, forward by the main hatchway it gives a measurement of 7 feet; still further aft, from 7 feet ½ inch to 7 feet 1 inch; the height in the saloon measures from 7 feet 6 inches to 7 feet 7½ inches.

The main deck, properly so called, or central portion, yields a total cubic space of 23,688 feet, a superficial area of 3,388 square feet, and will, therefore, afford to each individual of the proposed number to be accommodated therein, viz., 44 in cots, and 30 in hammocks, including attendants, 320 cubic feet and about 46 square feet of superfices.

The cots are to be slung between stancheons, on the swinging principle, in single tiers, each at a distance of about 4 feet 3 inches from the deck above, measured from the fulcra or points of their suspension from stancheons; these cots, as will be described hereafter, can be made stationary at will by means of a small catch fitting into a socket lower down in each stancheon; the hammocks are to be attached to hooks in the usual fashion.

Forward, and adjoining the bulkhead on each side, is a row of four earthenware ablution basins, fitted with afferent, efferent pipes and taps, fixed in a wooden frame, 9 feet 10¾ inches long by 1 foot 8 inches broad, affording good accommodation for the purpose of cleanliness, and supplied from the iron tanks situated at upper and back of slops' receptacle on upper deck; it receives light from the skylight before mentioned, in the description of the upper deck, as transmitting it in this situation to the fore part of main deck.

Hereabouts are to be found, on each side, a square-trunked wooden funnel, traversing the between-decks from the lower one, making its way upwards to one of the elliptoid trap, chimney-like ventilators in upper deck; a circular iron funnel, emerging also from the lower deck to terminate on the upper in a cowl, and another, commencing within 1 foot of the floor of the deck, by an expanded quadrangular mouth, 1 foot square, gradually merging into a circular tube, to arrive also at a cowl on the upper deck; this and similar funnels have a number of circular openings, 1½ inches in diameter, punched out of the metal close to the roof of the deck, to act as "uptakes" when necessary.

The fore main hatchway, amidships, corresponds in every respect with its fellow in the upper deck; and at a little distance from its forward angles on each side, another trunked wooden quadrangular funnel makes its way from

* *Vide* Diagram No. 2 appended, of a scale of 20 feet to an inch.

the deck below. At its aft portside angle is the ventilating tube previously described as an old fitting of the ship, and commencing inferiorly in the lower deck, terminating above the portside forward angle of the washing-house in a cowl.

A little further aft, and on each side, is a water-closet, intended chiefly for those more seriously ill, containing two seats, constructed as a quadrangular room or compartment, measuring 7 feet in height, 3 feet 3 inches in breadth, and 4 feet 4 inches in front, furnished with door, lock, and key, separate scuttle, &c.

Next in order, and amidships, is a large square opening for coals to feed the bunkers, on each side of which, and a little more aft appear, another quadrangular trunked wooden air-funnel, another circular iron tube emerging from the lowest or orlop deck below, another of similar size and appearance from lower deck, whilst still more centrally, and immediately in front of a wooden building to be described in next paragraph, and occupying the entire of a large central portion of this deck amidships, are the two foremost tubes of Dr. Edmonds' system, making their exits from below, one on each side, to their destinations above.

This structure, alluded to in preceding paragraph, possesses a height of that of the between decks, is 48 feet long, 11 feet 6 inches broad; it contains in its fore part two large bath-rooms, one on each side, having large stationary reclining baths, with water-taps and shower-baths above. These rooms are 7 feet 1 inch in height, about 11 feet 6 inches in length, and about 5 feet 6 inches in breadth. They are supplied with salt water by means of the two metal tanks on each side of the engine steam funnel described in connection with the upper deck. The doors and sides at the top are fitted with louvred Venetian windows, &c.*

Immediately behind these is a central portion belonging to the engine-room, running along each side of which is another circular iron tube, another square trunked funnel, another main-deck iron funnel, commencing within one foot of the deck, and again another square trunked wooden air-funnel, arriving at its exit in the upper deck. Abaft the central or engine-room portion, and terminating the block, is the hospital surgery, well lighted from the upper deck by means of sloping glazed windows, inclining downwards on each side from a central flat wooden ridge, moveable on hinges, whereby they can be raised to various heights for ventilation or increased light. This room is of an irregular quadrilateral form, and, for the sake of describing its measurement, must be divided into a front or larger, an after or smaller, subdivision. The former presents the following capacity, viz.:—A width, *i. e.* across from side toside, of 11 feet 4½ inches; a length, or antero-posterior extent, of 6 feet 1 inch; and a height, from floor to central ridge of skylight, of 10 feet 1½ inches. The latter, a width across from side to side of 10 feet 4½ inches; a length of 4 feet; and a height, from floor to top, of 6 feet and ½ an inch. The whole, thus constituted, is conveniently situated, compact, and has been fitted up by Messrs. Savory and Moore with a good stock of medicines and the appliances necessary for dispensing, contained in fixtures, shelves, presses, drawers, and suspended from racks passing above and across throughout the length of the larger division underneath the skylight.

In the surgery is a large metal tank for fresh water, fitted with a filter, fed by a larger one situated above, over wooden ridge of skylight, the combination originally designed as the source of supply of drinking water for the saloon, during previous passengers' voyages made by this ship.

The surgery is to answer the purposes of office and operating room as well; and a suitable surgical table has been provided, fitted with legs which can be screwed into the floor or deck beneath, &c.

On each side of surgery is another maindeck funnel, commencing, in the usual manner, about one foot from the floor of the deck; also another of the square trunked wooden air-shafts. Behind and amidships is the mainmast, with a capacious metal tank attached to it on its starboard side, furnished with a tap, and capable of containing about 200 gallons of water for the use of this deck. Behind the mainmast is the after main hatchway, and on each side

* The windows at the sides were removed for ventilation, and canvas rolling blinds or curtains fitted in their stead.

another circular iron tube emerging from lower deck; also another of similar kind and calibre, but rising up from the orlop deck.

Close upon the hindermost angles of the after main hatch are other two iron ventilating tubes, one on each side, emerging from lower to reach the upper deck, and terminate there, where they have been before described as towering above the deck-house, which contains the companion, Captain's cabin, &c. Beyond them are two more of the already frequently-mentioned square trunked wooden air-shafts, leading from the lower deck up to the elliptoid trap chimney, like ventilators on upper deck, one on each side.

Amidships, immediately behind the main after hatchway (which resembles its fellow immediately above in all material respects), between it and saloon partition, is the companion, or stairs of descent from the deck above down to the deck below, and thence into the saloon.

In the sides of the main deck there are 20 scuttles on the starboard, and 19 on the port side. These, however, include one contained in each of the water-closets here situated, which should be deducted from the total available for deck ventilation, &c., leaving the numbers 19 on the starboard, and 18 on the port side. They are quadrilateral in shape, and measure 9¼ inches by 7 inches. The main-deck elliptoid trap openings are situated perhaps rather too closely to these, being distant, in an oblique line above and within, in some instances only 19 inches, in others 19¾ and 20 inches.

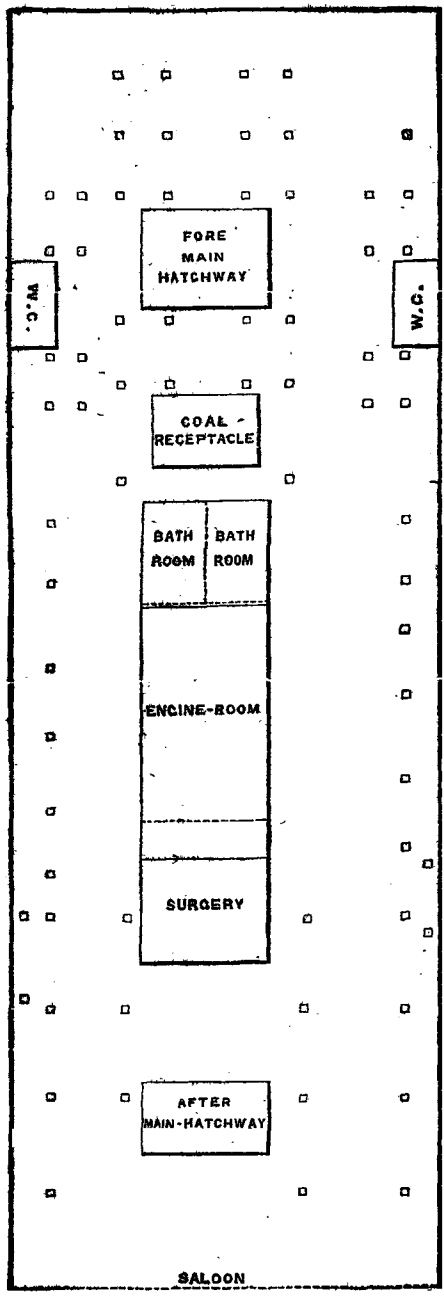
Forward, also in the sides of this deck, and just abaft the water-closets on each side, is a large square doorway or opening, which can be closed or opened at will, but is only available in the latter condition during calm weather at sea, or when at anchor in port. It is called a cargo port, its name implies its use, and it has the following dimensions, viz.:—4 feet 3 inches in length, by 3 feet 6 inches in breadth.

The means at command of lighting and ventilating this deck may be shortly summed up as follows, viz.:—19 scuttles and a cargo port on starboard side. 18 scuttles and a cargo port on port side; in the deck above, and along the centre, a fore skylight, a fore main hatchway, a skylight over surgery, an after main hatchway, a deck-house, containing the doorway of companion leading from saloon; along each side, five elliptoid trap ventilators, and four circular iron ventilators, commencing within a foot of the floor of deck, and perforated by holes near the top above, as before alluded to.

On this deck, stancheons have been erected in the space between decks, whereon to hang the cots. They are wooden quadrangular posts, cleated to the decks above and below. They contain iron fulcra, distant 4 feet 11 inches from the floor beneath; likewise iron catches, by which the swinging motion of the cot can be stopped at will, which are distant 1 foot 5 inches from the fulcrum above, and about the same from the deck below. On one of the two stancheons, between which each cot rests, is an iron loop fixed, distant from top of deck 1 foot 11 inches, for the purpose of fastening a small bed-table, whereon to place glasses, books, &c., and which shall be presently described.

The stancheons are arranged so that the cots may be slung with their long axis fore and aft, in single tiers, conveniently low to the floor of deck for a patient to step in or out with great facility, yet sufficiently high to admit of the deck being thoroughly cleaned underneath them, without their being unshipped from their places.

The following is the general disposal of the stancheons on this deck, and a reference to the annexed rough diagram will greatly facilitate the understanding of their description, viz.:—In front of the fore main hatchway, between it and



foremost bulkhead, are stancheons for eight cots in pairs, by two and two running fore and aft, distant about 2 feet 9 inches from each other. A broad passage, separating those of each side, is about 4 feet 8 inches wide.

Behind the main hatchway, between it and the square receptacle for bunker coals, is a similar disposition in pairs, for four more cots, each distant 3 feet

5 inches from its neighbour, but each pair centrally separated by a broad mid passage, 4 feet 3½ inches wide.

On each side of main hatchway and square coal receptacle, and extending as far back as the bath-rooms, stancheons for cots are arranged in parallel lines, in a double, a partly single, and partly triple row, filling up the spaces on each side; the outermost ones distant from the side of the ship from 4 feet 1 inch to 4 feet 3 inches in some places, and only 2 feet 11 inches in others; the next distant from the outermost, from 2 feet 5 inches to about 3 feet 8 inches; the next from the preceding, about 4 feet 9 inches; and these last, from side of square coal receptacle, about 1 foot 3½ inches: thus the widest intervals, or those between the innermost row and the next, are passages which vary in width from 4 feet 9 inches to 7 feet 1½ inches, the broadest portion, which is forward about the centre of the side of the main hatchway, and where a single cot only is disposed between the hatchway on one side and the water-closet on the other, distant from the former 7 feet 1½ inches, and from the latter 3 feet 8 inches.

On each side of central wooden block containing bath rooms, engine-rooms, &c., the stancheons for cots are arranged between this and the side of the deck in single files, five for three cots disposed lengthways; these are distant from the side of the deck by intervals varying from 2 feet 9 inches to 3 feet 4 inches, and those last again are distant from the side of the wooden block, about 3 feet 6 inches; along the side of the block are arranged six tables for dining purposes, &c., between the ends of which and the stancheons is a passage about 2 feet 4 inches in width.

Getting still further aft, and behind the surgery, stancheons for cots are disposed, first in one triple, afterwards in double rows on each side of the after main hatchway; these are distant, the outermost of the first row from side of ship, about 2 feet; the next from the outermost about 3 feet 2½ inches; the innermost from the middle about 3 feet 5 inches; and the innermost from side of wooden block 2 feet 9 inches; the remaining ones extend back to near the saloon in double piles, are distant, the outermost ones from the side of ship, about 5 feet 5 inches to 5 feet 7 inches; these from next row, 3 feet 5 inches, which are again distant from the edge of the after main hatchway about 4 feet 8 inches, and constituting the width of the passage directly outside the saloon doors.

Besides all these there is an interval between two stancheons forward on starboard side, for one cot, which has no counterpart or fellow on the opposite, situated parallel to and distant 7 feet 2 inches from the second tier of stancheons in front of fore main hatchway, already mentioned, and close to the ablution basins hereabouts, separated 4 feet 3 inches from side of ship.

It may then be stated in general terms that the cots are distant from the side of the ship in some instances only 2 feet, in others 2 feet 6 inches, 2 feet 9 inches, 3 feet 2 inches, 4 feet 3 inches, or even as much as 5 feet 5 or 7 inches; from each other in some cases 2 feet 4 inches, in others 2 feet 9 inches, 3 feet 8 inches, 4 feet 3½ inches, 4 feet 9 inches, or even 7 feet 1½ inches, the wider distances constituting the passages for attendants and general traffic throughout.

The stancheons measure about 3½ inches in breadth, and are distant lengthways from each other, so as to admit of the reception of the cots between them, about 6 feet 8 inches; iron rings have been provided, to be screwed on the stancheons as holders of chamber utensils.

Small square bed tables fit by hooks and iron loops into one of every pair of stancheons holding a cot, about 2 feet 11 inches from top of deck, and about 2 feet from the cot "fulcrum" below; these tables are square, measuring 1 foot 8 inches in length, by 1 foot 2 inches in breadth, and 3½ inches in depth, fitted at the top with a moveable "lid," like shelf, having a large circular hole, 10 inches in diameter, cut in its centre, wherein to place bowls, &c.; two smaller holes on one side, with diameters of 2 and 2½ inches respectively, and three others on the opposite side, with diameters of 2 and 3½ inches across, so as to contain bottles, draughts, &c.

At intervals along the sides of the deck are small wooden shelves or brackets having each a central circular aperture, 7¼ inches in diameter, for holding chamber utensils; these are fixed at a short distance from the floor of deck, &c.

The saloon contains cabin accommodation said to be intended for 15 sick

officers. There are, however, three cabins for them on starboard, and four on the port side, besides the port stern cabin; each side cabin has been fitted with two, and the stern one with three bunks; there is therefore in reality room for 17 sick officers on board, or for 15, with a spare cabin for the accommodation of an extra Medical Officer who may possibly be required.

These cabins measure on the port side in height 7 feet 6 inches, in length 6 feet 2½ inches, or 6 feet 10½ inches, or 6 feet 4½ inches; in width, 9 feet 1 inch, 9 feet 1½ inches, or 8 feet 7½ inches, &c.

The port stern cabin in height, 7 feet 6 inches; in length, 14 feet 5 inches; and in width, 10 feet 3½ inches, &c.

Thus all the usual allowances for ventilating apertures, and deductions for bunks, furniture, &c., being made, each side cabin affords an entire capacity of about 640 cubic feet, or when holding two sick officers, of about 320 cubic feet per head; and the port stern cabin, an entire capacity of about 1,072 cubic feet, or when holding three sick officers, of about 357 cubic feet per head.

These cabins have had their previous outer walls of ornamental maple paneling pulled down (to admit of their being widened to an extent of 2 feet), which has been replaced by painted deal planking incomplete at the top, and about 6½ feet in height, containing below and about 5 inches from the floor of deck, several small circular holes (one in each plank), each one about 1½ inches in diameter; also two perforated zinc plates, measuring each 1 foot in length, and 8 inches in breadth, for every cabin; these open in upon the saloon, and are placed at a distance of about 4 feet 7 inches from the floor below; the partitions between are also incomplete at the top, to admit of fore and aft ventilation.

The cabins have each a separate scuttle of the dimensions of those on the main deck; also an elliptoid trap ventilator; there is a water-closet in the passage which separates the cabins in sets or pairs, shut off, distinct in itself, and having an independent ventilation of its own.

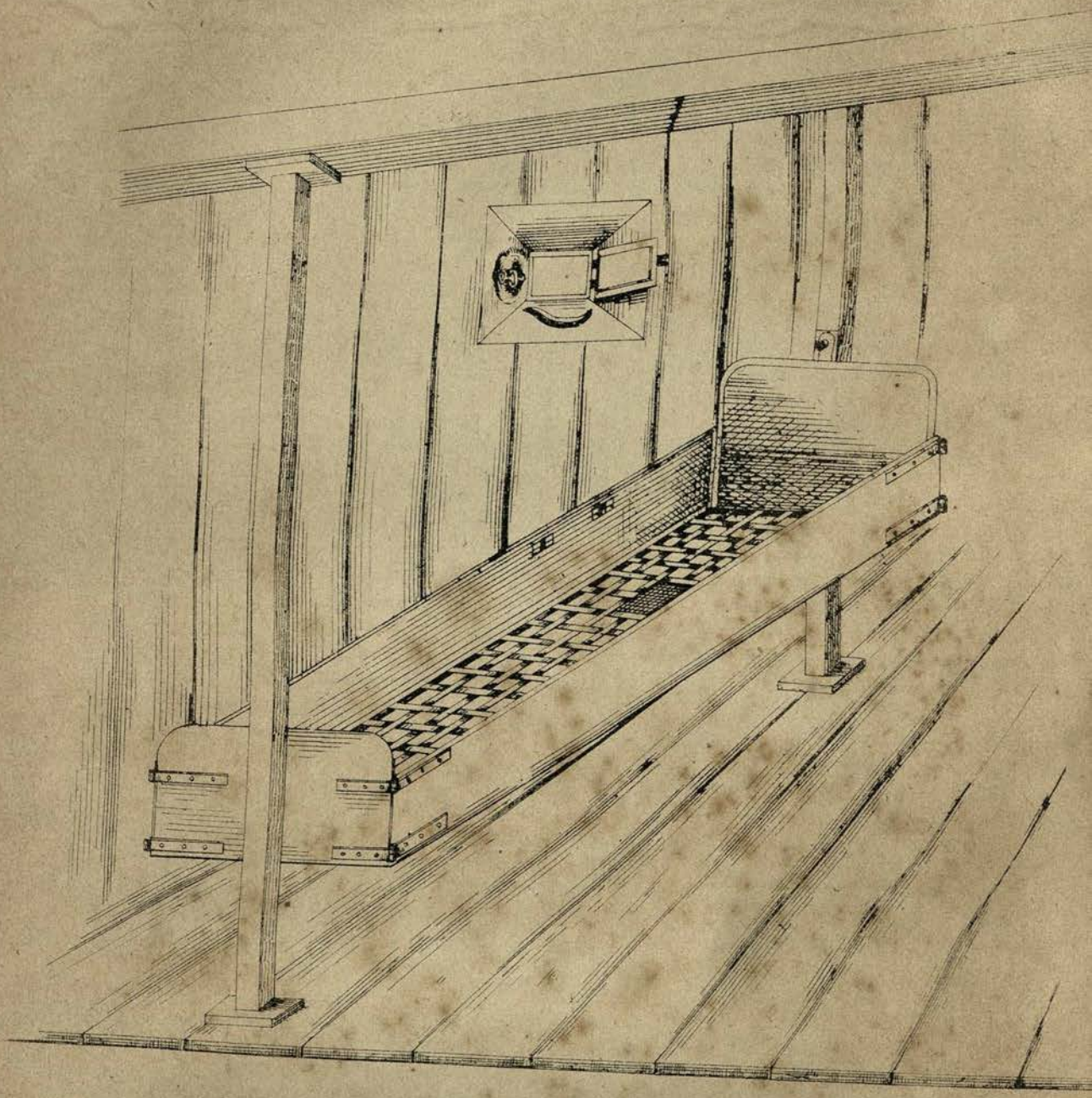
The port stern cabin for three sick officers has two large sternports aft, and a scuttle of usual size forward in the side; the panelings all round, which reach up to the top of the deck, are fitted with venetian jalousies below as well as above for ventilation.

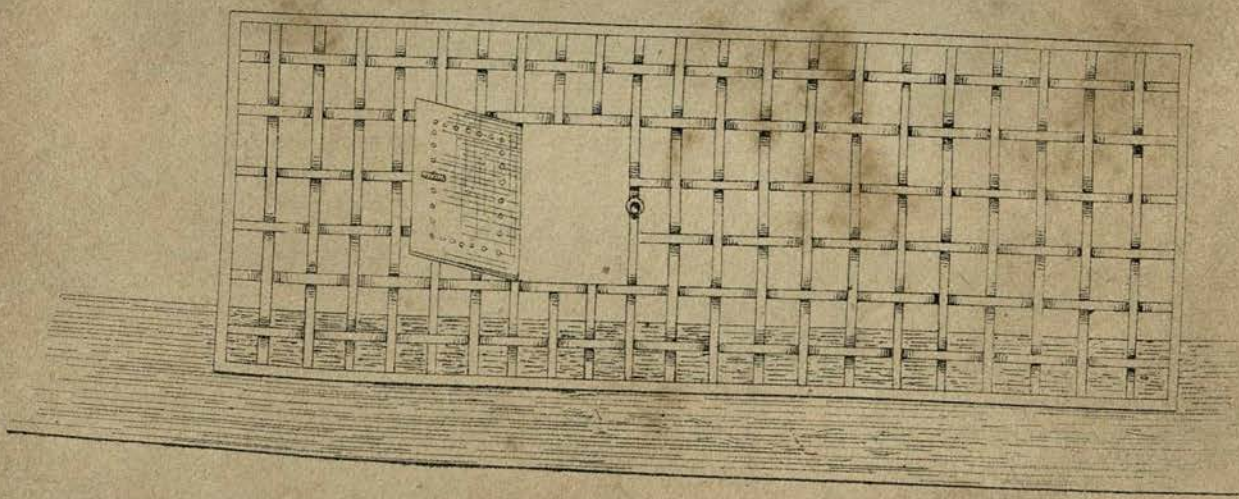
In the centre, aft between the two stern cabins, is an open interval divided vertically in the centre by the rudder and screw shaft casing into two subdivisions, each one open about 2 feet in width, through which light and air from two large central stern ports penetrate directly into the saloon; these ports, as well as those of the stern cabins, measure 2 feet 8 inches, by 3 feet in length; they are square in form, and assist materially in the general scheme of the ventilation of this portion of the ship.

The saloon is lighted by means of the three skylights previously described when writing of the deck above, viz., 1st, that just aft the Captain's cabin; 2nd and 3rd, those on quarter-deck, having the mizenmast between them; the 1st and 2nd communicate with the lower deck by means of quadrilateral trunked air shafts, traversing the saloon in two places, surrounded by a railed-in space, as they perforate the floor, emerging to reach their destination above; they widen as they ascend, opening into an expanded quadrilateral mouth as they approach the skylights, communicating with the outer air through them by means of openings, the measurements of which I have before given; their shafts measure across the broadest sides, 2 feet 4½ inches, and across the narrowest or ends, about 1 foot 9 inches; fitted into their widening sides are two panes of glass for each shaft, and inserted into the inclines on each side, so as to transmit light down into the saloon, which otherwise would have been deprived of a considerable amount, had not this arrangement been put in force.

Four large iron circular ventilating tubes are also to be seen extending in pairs up through the saloon, as they make their way from lower to upper deck. The foremost pair, one on each side, of larger calibre than the others, and constructed of galvanized iron, are the aft main ventilating tubes or shafts of Dr. Edmonds' patent system before described; the other or hindermost pair, and distant from each other by a wider interval than separates those just described, are the tubes or shafts of number "eleven" ventilators, mentioned before as situated upon the quarterdeck laterally, one on each side of the mizenmast, where they terminate, each one in its own proper cowl or head.

HOSPITAL FRACTURE COT.

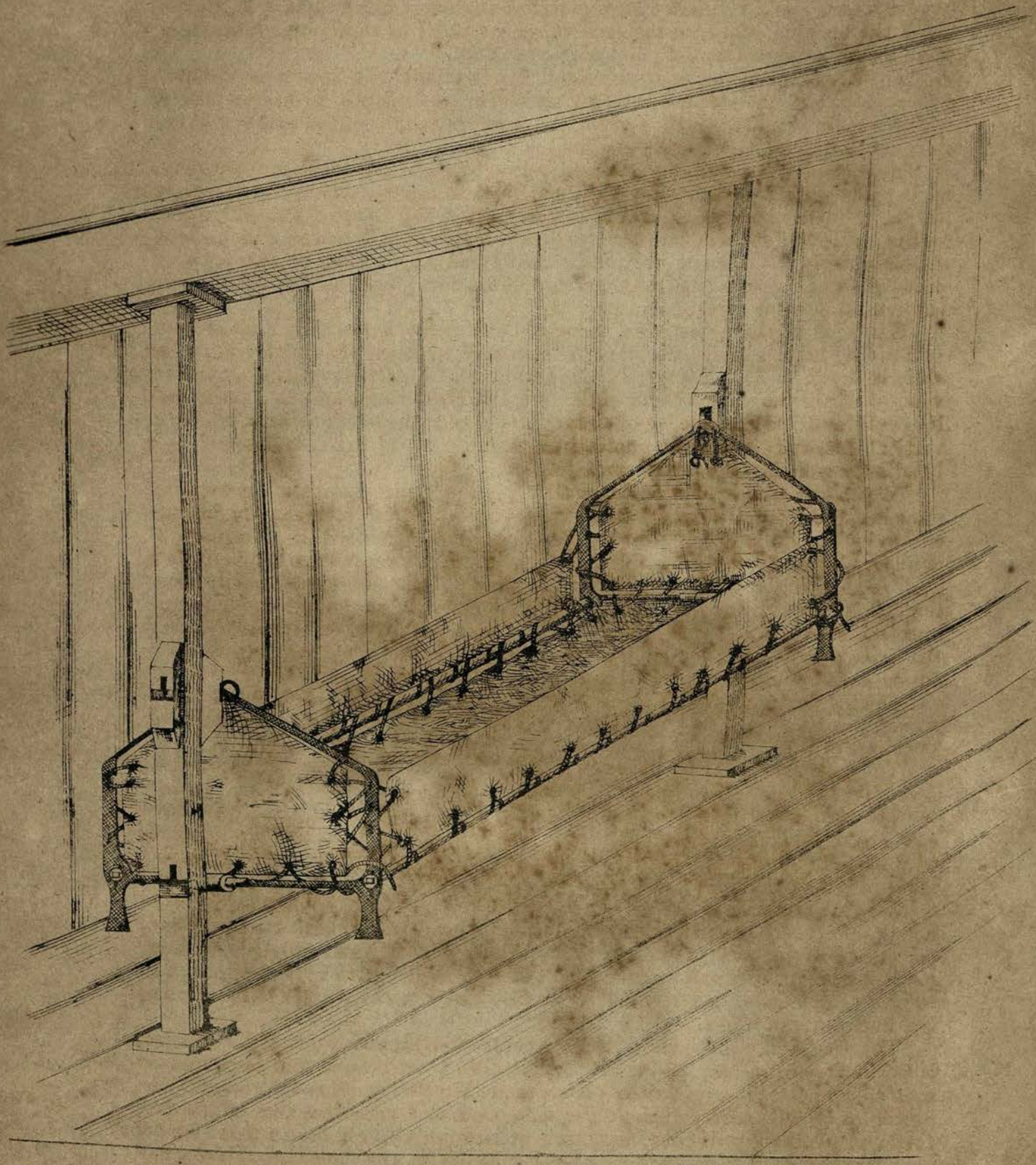




MOVEABLE BOTTOM.

No I.

ORDINARY HOSPITAL COT.



A few words about Dr. Edmonds' "Air Propellers,"* which have been furnished, one for each ventilator, may not here perhaps be considered as misplaced. These fit into the large iron tubes when the cowls are removed, and are worked each one by a strap, "the easy labour of one man."

Each one is a species of cylinder or cylindrical box, having a substantial mahogany top about 1¼ inches thick, and 1 foot 7 inches in diameter, in the centre of which is a circular aperture 8 inches in diameter, bridged across by two brass bars, each 1¼ inches wide, elevated angularly to a height of 2¼ inches above the opening, and crossing each other centrally at right angles, where a small socket is formed at the point of decussation.

The body of propeller is a galvanized iron cylinder, 54 inches in circumference (about 17 inches in diameter), and 8 inches in depth, to fit completely within a main ventilating tube when the cowl is removed, the mahogany top alone projecting above when thus placed *in situ*.

The bottom of the cylinder is closed below by a circular piece of mahogany, having along its circumference eight oblong deficiences, each one 4 inches in length, 1½ inches in breadth, and 2½ inches distant, end to end from each other. In the centre is fixed a square piece of brass, containing a socket which corresponds exactly to the one previously mentioned as existing at the point of decussation of the two angularly elevated brass bars above, as they bridge over the central opening of the mahogany top.

Extended vertically between, moveable and revolving in these two sockets, is a round brass spindle, the upper 4 inches of which is free, where a leather strap is fixed, and coils around it as it revolves. This strap passes through a vertical slit in the sides of one of the brass bars, thence across to a horizontal brass pulley fixed at the edge of circumference of mahogany top, on a line with vertical slit, and finally terminates in a round ring of brass, to be used as a handle for working the instrument.

To the remainder of spindle, or that portion entirely within the cavity of propeller, are fixed six quadrilateral thin plates of brass at right angles, and occupying laterally the entire extent *nearly* of corresponding diameters of cylinder, but so as to be capable of being very freely moved centrifugally in a horizontal direction within it. By sudden and alternate extensions and relaxations, this strap, from impetus given by the strength of former force, is first uncoiled and then coiled again around the spindle above, so that in this way the brass plates are brought into constant, forcible, and rapid motion, whereby strong currents are produced (the air entering from above), and forced through the oblong openings at the circumference of wooden bottom of cylinder downwards, through the main tubes into the horizontal shafts, and thence through openings in these, diffused throughout the lower deck below.

The cots* are of two kinds: first, those for general use, or Buckle's cots; secondly, those for special use, or fracture cots.

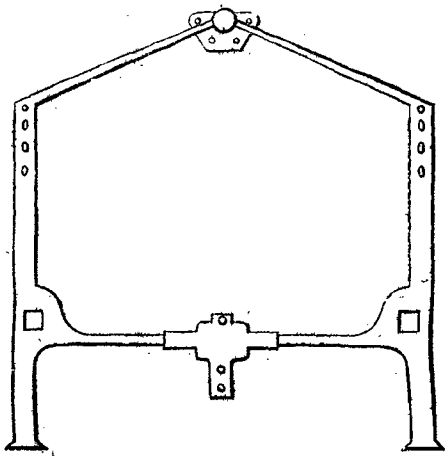
The former—6 feet 3 inches in length, 2 feet 3 inches in breadth—consist each one of two circular hollow tubular iron side-poles, two iron frame-like end-pieces; and end-pieces, side-pieces, and a bottom piece, which are laced on, and made of canvas sacking.

The tubes measure each 4½ inches in circumference, 6 feet 2 inches in length, and fit by means of quadrangular ends into square mortises of the end-pieces, at the junction of their horizontal with vertical bars; fixed there externally, by means of small circular plates of iron with square central openings in them to correspond, and secured by an iron pin, somewhat after the fashion of the linchpin of a wheel.

The frame-like end-pieces, each of comparatively small make and slender, consist of two iron bars 16 inches long, inclining downwards and outwards on each side, and forming a central obtuse angle superiorly, where is a round iron button to fit into a receptacle in the stancheon, and thus form one of the two fulcra, or points of swinging suspension, of two vertical iron bars, 1 foot 5 inches long, one on each side, forming lateral angles with the preceding above, and terminating inferiorly in the legs of the cot below, which legs are connected together above, and at a distance of about 4½ inches from their extreme ends, by a horizontal iron bar 2 feet 1 inch in length, at the points of junction with which the square mortises for the side-poles, already mentioned, exist.

* *Vide* illustrations appended.

At the centre of this bar, which is here deficient, is a strong circular ferrule which complements and embraces it all round. This contrivance works on a screw, thereby lengthening or shortening the bar, and so the intervals between the mortises as occasion may require, and proves advantageous in tightening the canvas bottom when laced. This revolving ferule contains a long tongue, made to fit into a receptacle on the stancheon, and forms one of the two points of arrest of motion, whereby the swinging of the cots can be stopped at will. The following rough diagram is intended to represent one of the end-pieces just mentioned, viz. :—



The canvas sides are made to lace round the side-poles and horizontal bars of end-pieces, and through eyelet-holes into the remaining end-bars, &c. The central vertical height of these pieces, from superior angle to the centre of an imaginary line connecting the ends of the legs, measures 1 foot 11 inches, and that from ferule of horizontal bar to same point extends to about 4½ inches.

These cots hang, the side-poles distant from floor of deck about 1 foot 5 inches, and the ends of the legs about 12 inches.

The latter, or fracture cots, 7 feet long, 2 feet 4 inches broad, form a sort of long iron box or metal frame, and consist each one of two sheet-iron side-pieces, two sheet-iron ends (*i.e.*, a head-piece and foot-piece), and a moveable bottom made of an open work of cross-barred iron laths laid over each other at right angles. This last fits and rests upon projecting ledges 1 inch wide, which extend inwards along the four sides respectively of the entire solid framework of the cot, and attached inferiorly for that purpose.

The head-pieces measure 1 foot 5½ inches in height, 2 feet 2¼ inches in width; the foot-pieces 1 foot 2 inches in height, by 2 feet 2¼ inches in width; the side-pieces are each 7 feet long, and 11 inches high.

The sides and ends fit together by means of vertical hinges (like those of a gate in a gateway), which slip, the loops of the latter upon the tongues or tooth-like projections of the former, and so can be lifted off or replaced at will; these are eight in number, two at each corner of junction, one placed above, the other below.

In the cross-barred moveable bottom is a square fenestrated opening fitted with a square iron shutter, or door, to match, on hinges, which can be opened or shut at will, and fastened outside below by a strong loop and pin. In this way (a corresponding opening and moveable centre-piece to fit in, existing in the mattress) the patient's excreta can be readily removed without the least disturbance of position—a point of great moment in the treatment of fractures and similar injuries.

This opening is situated so as to be distant about 2 feet 4 inches from head-piece of cot, 3 feet 9 inches from foot-piece, and 8 inches from each side-piece laterally. It measures in extent about 10½ inches long (*i.e.*, long axis of cot), and 11½ inches wide (*i.e.*, in transverse axis of cot).

The lateral bars of the entire moveable bottom, and the two cross-bars extending across it, which assist in forming this opening, and in the interval between which it exists, are thicker, and of more substantial material and make, than any of the other iron laths in this framework.

These cots, four in number only, are heavy it is true, but strong and very substantial, taking up but a very little more room than the ordinary ones, but affording a steadier, more resisting, and firmer support. They hang by means of iron plates attached, one at each end, from hooks of suspension in their own stancheons; and can be fixed, and their swinging motion stopped at will, by means of small toothed processes below, one at each end, which are received within suitable sockets fitted for them appropriately in the stancheons.

To the right-hand side pieces of these cots are attached four iron loops, in pairs—two on the inside and two on the outside—in which small wooden bedside tables, 1 foot 8½ inches long by 10½ inches broad, can be fixed by means of the short end-pieces bent at right angles of two parallel iron bars, which are screwed across their under-surfaces, and serve to afford them the necessary support when properly adjusted.

These tables are convenient, and can be fitted on so as to project to the inside or outside of cot, or be removed altogether, as occasion may require.

ANALYSIS of Condensed and Unfiltered Water pumped from the Tanks on Board the "Queen of the South," and a Comparison of it with good Drinking Water.

Physical and Qualitative, &c.	Quantitative.	Grains per Gallon. Good Water should not contain more than Grains per Gallon as below.	Grains per Gallon. Results of this Analysis.	Excess.
Colour: colourless	Organic matter	1·5	1·036	....
Taste: flat	Oxygen to oxidine	·075	·05180	...
Smell: inodorous	Chlorine	4 to 6	2·9323	...
Sediment: none	Lime	4 to 7	·9996	...
Re-action: none	Magnesia	2 to 4	·98	...
Qualitative	Sulphuric acid	2 to 4	4·20	·20
Organic matter: none	Iron	A trace	...	...
Nitrous acid: no re-action ...	As per Clark's scale — Total hardness ...	16	6·405	...
Nitric acid: none...	As per Clark's scale — Permanent ...	4	3·50	...
Phosphoric acid: present	As per Clark's scale — Removeable ...	12	2·905	...
Sulphuric acid: copious precipitate.	Carbonic acid in cubic inches ...	6·12	4·030	...
Chlorine: present	Volatile solids other than organic..	1 to 2	·084	...
Lime: slight precipitate	Total volatile solids	2 to 4	1·120	...
Iron: none	Mineral solids	25 to 30	17·080	...
Sulphur-hydrogen: none	Total solids	30 to 35	18·200	...
Lead: none	Lead	...	...	...
Ammonia: none	... ...	...	...	...

NOTE.—This water is very suitable for drinking purposes.

It is slightly deficient in carbonic acid, and consequently has not that pleasant brisk taste which water, rich in that gas, always affords.

It probably may have absorbed a little carbonic acid from the air during examination, and also when being pumped from the tanks, there being no aerating apparatus on board.

It presents only one material in excess, viz., sulphuric acid in very insignificant amount.

The presence of organic matter was not evident by the qualitative test, viz., boiling the water with a solution of terchloride of gold; the quantitative was determined by the permanganate solution, one gramme to the litre.

Phosphoric acid was tested for by sulphate of magnesia and liquor ammoniæ; sulphuric acid was evidenced by dilute hydrochloric acid and chloride of barium, *i.e.*, qualitatively; quantitatively, by barytic solution and graduated soap solution test. Lead was tested for by acidulating the water, evaporating, adding a little acetate of ammonia, and passing sulphuretted hydrogen gas through it.

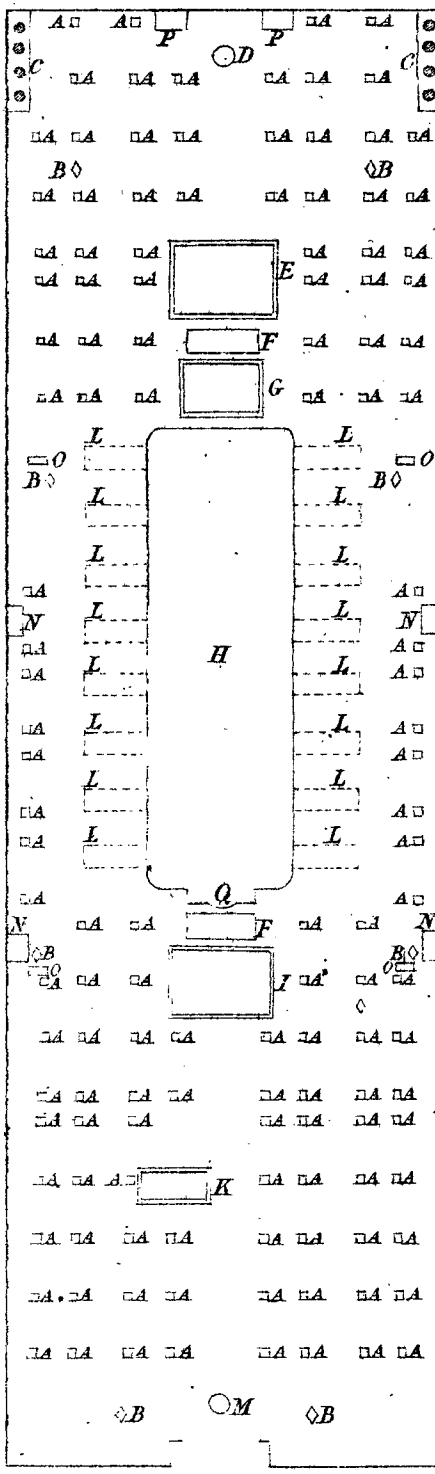
In this analysis I was most ably and kindly assisted by Staff Assistant-Surgeon W. J. Wheeler.

EXPERIMENT* made on board the "Queen of the South," on the 16th December, 1867, for the Purpose of ascertaining the Amount of Carbonic Acid in the Air, Temperature, &c.

Date.	Hour.	No. of Men.	Total Cubic Space. Total.	Per Man.	Total Superficial Space. Total.	Per Man.	Carbonic Acid per 100 Volumes.	Temperature of Engine Room.	External Hygrometrical Observations. Barometer	Dry Bulb.	Wet Bulb.	Dew Point.	Elastic Force of Vapour.	Vapour in a Cubic Foot of Air.	Vapour required to Saturate.	Humidity.	Weight of a Cubic Foot.	Internal Hygrometrical. Barometer.	Dry Bulb.	Wet Bulb.	Dew Point.	Elastic Force of Vapour.	Vapour in a Cubic Foot of Air.	Vapour required to Saturate a Foot.	Humidity.	Weight of a Cubic Foot of Air.	Direction of Wind.	Velocity.	Remarks.
16	9	22	23,680	1,076	3,388	154	...	...	30·06	79·5	77·	75·25	·8770	9·40	1·40	87·5	512·8	30·06	84·0	82·5	81·50	1·069	11·4*	1·60	92·5	507·1	N.E	13·70	
16	10	...	...	...	...	...	...	106°	...	80·0	78·0	76·6	·916	9·8	1·2	90·	511·7	...	84·0	82·7	81·82	1·451	11·52	1·72	93·5	507·1	...	12·40	During the 2nd, 3rd, and 4th, observations there was rain. The lat. was 3° 28′ N., the long. was 60° 40′ E., at 12 o'clock P.M.
...	11	...	...	...	...	...	·690	...	30 04	77·	76·5	76·15	·9020	9·75	·75	97·0	514·4	30·04	83·0	82 0	81·3	1·067	11·7	0·6	95·	507·6	...	12·70	
...	12	...	...	...	...	...	...	106°	...	81·0	79·8	79·98	·1371	10·58	1·68	94·	510·2	...	85·0	84·3	83·88	1·156	12·31	·91	96·5	505·3	...	12·73	
...	1	...	...	...	...	...	·842	...	30·04	77·0	75·3	74·11	·8431	9·08	1·28	90·5	514·7	...	80·0	77·0	75·0	·867	9·3	1·7	85·	511·7	...	13·54	
...	2	...	...	...	...	...	...	...	...	76·0	74·	72·6	·801	8·6	1·1	89·	515·9	...	78·5	76·0	74·25	·866	9·10	1·35	86·5	513·6	N.	13·0	
...	3	...	...	...	...	...	·594	105°	30·04	76·0	75·2	73·96	·8578	9·30	·60	95·2	515·6	30·04	78·0	76·	74·6	·857	9·2	1·1	89·	513·6	N.	14·7	
Columns		...	...	...	...	...	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	

	Barometer.		Thermometer.				Hygrometer.											
	Inches.	Inches.	Temperature of Air.		Temperature of Evaporation.		Temperature of Dew Point.		Elastic Force of Vapour.		Vapour in a Cubic Foot of Air.		Vapour required to Saturate.		Humidity.		Weight of a Cubic Foot of Air.	
Columns	No. 2	No. 12	4	13	5	14	6	15	7	16	8	17	9	18	10	19	11	20
Maximum	30·06	30·06	81·0	85·0	79·8	84·3	79·98	83·88	·916	1·451	10·58	11·52	1·68	1·72	97·0	93·5	515·9	513·6
Minimum	30·04	30·04	76·0	78·	74·0	76·0	72·6	74·6	·801	·866	8·6	9·2	·60	·6	89·	85·	510·2	505·3

* Experiment conducted by Staff Assistant Surgeon W. I. Wheeler.



LOWER DECK

A Stanchions
B Metal Ventilators opening within 1 Foot of Floor
C Ablution Basins
D Fore-mast
E Foremain Hatchway
F Water Tanks
G Coal Receptacle
H Engine Room
I Main Hatchway
K Hatchway to Water Tanks &c.
L Tables
M Mizen Mast
N Coal bunkers
O Air Shafts
P Passages leading to Chain lockers
Q Projection of Main Mast

On the arrival of the vessel at Annesley Bay, 26th December, 1867, the writer, in anticipation of the hot season, made application for the supply of native servants in the following proportion, viz.:—Four dhobies, six punkah-pullers, four ward coolies, four sweepers, and two cooks, as a minimum amount of the native service likely to be requisite. This has been approved of, and measures already taken to carry it into effect.

The main deck of the ship was placed in readiness to receive sick men immediately upon our anchoring here; but the first batch of patients did not come on board until the 20th of January, 1868, owing to the fact of the other hospital ships having arrived before the "Queen of the South," and being supplied first. So great, however, were demands made upon all available labour by the various heads of departments in connection with the expeditionary force at Zoullah Camp, that it was not until the 27th of January that the cargo of Maltese carts, cases, wheels, &c., was finally and altogether removed from the lower deck, and preparations were made for rendering it available for hospital service.

On the 20th of January the "Queen of the South" was, by means of a spring on her cable, moored broadside on to the wind, so as to move with, and receive along her entire extent, the full benefit of every breeze, no matter from what quarter it may happen to blow; an arrangement which has had a very sensible effect in diminishing the thermometric range, and has proved most grateful to the personal feelings of all on board.

The bilge of this vessel may be described as having three distinct compartments—a foremost portion, or that forward in front of the engine-room, which is again arranged, by a bulkhead, into two nearly equal subdivisions—a central portion, or that beneath the engine-room, and an aft portion, or that behind the engine-room; all of these freely communicate with each other, fore and aft, by means of valves or sluices, which can be opened or shut at will.

The central, or engine-room portion, can be easily pumped out at any time by the donkey-engine; the forward and aft compartments have to be emptied independently by means of the usual hand-pumps, at a considerable expenditure of manual labour and time. Pipes might be easily fitted for the purpose of placing the entire bilge under proper steam control.

On arrival in Annesley Bay the bilge of the ship was thoroughly examined and overhauled.

A standing rule also has been made, by which the bilge is to be regularly flushed and pumped twice every week, on two stated days, and oftener, should it be found at all necessary. Thus it is confidently hoped that this most important part of an hospital ship may be kept in as proper and favourable a hygienic condition as is possible under the existing circumstances of the present case.

The lower deck* is not divided by iron bulkheads into water-tight compartments, like that of the "Mauritius" or "Golden Fleece," but runs flush right fore and aft, presenting a capacious, airy, and very fine appearance as an hospital ward.

It is limited in front by a bulkhead of wood, which is situated about 11½ feet further forwards than that of the main deck above, separating it from the boatswain's and carpenter's stores in that foremost portion of the ship already mentioned as having been assigned to the crew, &c., and where two square wooden casings for passages leading down into the chain lockers, are seen side by side projecting from it, in, on the deck.

It passes aft for a considerable way underneath the saloon, to a distance of at least two-thirds of its extent, where it terminates abruptly in another wooden bulkhead, which divides it from a small remaining portion of level space, which has been devoted to cabin accommodation for some of the ship's officers, saloon store-rooms, &c., and with which it communicates by means of a door, a mode of access to a flight of steps leading up aft directly into the saloon.

In the upper part of this partition-wall are small venetian windows, four in number, square, measuring 1 foot high by 1½ feet long, fitted with hinges so as to admit of their being entirely let down or raised up at will, and thus

* *Vide* accompanying diagram, scale 20 feet to an inch.

establishing a free current of air aft and upwards through the large stern windows of the saloon from the entire deck space right in front.

This deck possesses a height of 7 feet 10 inches, and measures, in breadth, 37 feet; in length, 170 feet, nearly; yielding a total cubic space of 40,552 feet; a superficial area of 5,407 square feet; and can, therefore, afford to each individual of the number proposed to be accommodated therein—viz., 90 in cots, and 30 in hammocks—an allowance of 338 cubic feet, and 46 square feet per man.

Adjoining the bulkhead forward, on each side is a row of earthenware ablution basins, fitted with afferent and efferent pipes, with water laid on, supplied from the tanks situated behind the "slops' receptacles" on upper deck. These basins are fitted into wooden framework similar to that belonging to the main deck; square tin vessels placed underneath them receive the water which has been used and let off, and are emptied by hand when necessary. Just beyond these, and situated rather more centrally, are to be found on each side the "first" metal ventilating shaft of this deck, single, and which, like those of the deck above, commence, within 12 inches of the floor, by an expanded quadrilateral mouth, 1 foot square, gradually merging into a circular tube, to terminate in a cowl on the side of the upper deck. Four of these are placed at intervals on each side, the "second," side by side with a square metal shaft, opening from the lowest, or orlop deck beneath, is situated further aft, and on a line nearly with the first of the series of tables arranged on each side of the great central wooden engine-room casing, the "third," also paired with a square metal shaft opening from orlop deck, and still more aft, is located on a line with, or opposite to, the forward angles of the after main hatchway; whilst the "fourth," single, like the first, is to be seen quite close to the after bulkhead, one on each side of the mizen mast there; these are the shafts which terminate in cowls on the quarter-deck above, as has been before described.

From before backwards, centrally amidships, are to be perceived in order, first, the square wooden projections backwards of the chain passages leading down into the chain lockers; next, the foremast; then the fore-main hatchway, corresponding to that one of the main deck above in every essential particular, and leading down into the Purveyor's rooms, issuing, and pack stores, &c.; immediately behind it is a metal fresh-water tank, capable of containing 200 gallons, supported between wooden stancheons, between the hatchway just spoken of and a square opening of a receptacle for coals, closed by a wooden lid; next in order is to be found the great central obstructing mass of this fine deck, namely, the wooden casing enclosing the engine-room, machinery, &c.; this possesses a height of that of the between decks, is quadrilateral in shape, and measures in breadth 12½ feet; in length, 53½ feet, and its presence constitutes the only irremediable fault which can here be found; along it are rows of tables, eight in number, on each side, for messing purposes, &c., moveable, so as to be unshipped with their corresponding forms at will; then comes another metal water-tank similar to the previous one, fixed against the trunk of the mainmast, which is concealed from view on each side by two iron plates firmly secured to it laterally; the after main hatchway is next perceived leading down into the two storerooms, which have been constructed of wood in that locality, one on the starboard side for sick officers' baggage, the other on portside for reserved medicines, &c.; then, but situated somewhat to the port-side of the central line of axis running fore and aft, a hatchway leading down to the water-tanks of the ship, where the water as condensed is received and stored, and the steaming heat of the process of condensing is always most perceptibly felt; and lastly of all is the prominent mizen-mast, having on each side of it the metal ventilators before mentioned, and behind it the door, square venetian openings, &c., the former opening upon the stairs leading to the after part of the saloon above.

On this deck there are no water-closets; here Fyffe's patent stools must be used, their contents carried up and emptied by hand into the slops receptacles in the upper deck; there are likewise no scuppers, as these could not well be made directly on the outside of the ship at or so near the water-line; scuppers could be contrived to open down into the bilge, an objectionable plan, and one which would open up many facilities for contaminating with impurities of every

description that portion of the vessel which should be so scrupulously guarded on all occasions; the refuse water, after scouring, &c., can always be emptied without much labour or inconvenience through either the coal ports or scuttles, which abound on each side.

There are 24 circular scuttles* on each side of this deck, 20 of which measure 11 inches in diameter, and four 9 inches; these open and shut in the usual fashion; besides these, there are three square coal ports* on the starboard side, measuring respectively 1 foot 9 inches by 1 foot 3 inches, 1 foot 10 inches by 1 foot 5 inches, and 1 foot 5 inches by 1 foot 5 inches; four on the port side, 1 foot 9 inches by 1 foot 3 inches, 1 foot 10 inches by 1 foot 5 inches, 1 foot 10 inches by 1 foot 5 inches; and lastly, 1 foot 6 inches by 1 foot 5 inches: these can all be closed by shutters moveable on hinges, and opening at will, or the contrary.

These all, of course, materially aid in the light and ventilation of this deck, which latter is altogether completed by the four metal ventilators on each side, already spoken of as commencing within 12 inches of the floor; the nine elliptical openings on each side, in the roof of deck leading upwards, by means of square trunked wooden air shafts to the elliptoid trap chimney like ventilators, already so fully described; the two hatchways, the two circular openings in the roof of deck, at the posterior angles of the after main hatchway, and leading to two circular metal ventilators, which traverse the main deck, and terminate in cowls just at each front or fore corner of the deck-house, which contains Captain's cabin and companion, at a height of 10 feet, as before so fully mentioned as the "tenth" pair; the two square wooden trunked shaft openings leading up through the saloon to the skylights on quarter-deck; and lastly by Dr. Edmonds' shaft extending horizontally, one on each side, for nearly the entire length of this deck, fore and aft.

The two last are the only appliances which require any special notice here, the others having all been already explained at length in preceding portions of this and previous reports, the former presenting in the roof of the lower deck quadrilateral central openings, which measure the fore one, 2 feet 3 inches by 1 foot 7 inches; the after one, 2 feet 2 inches by 1 foot 7 inches, and are disposed of in the mode already explained, whilst the latter afford points of particular interest, and are quadrilateral horizontal trunked wooden air shafts, extending, fore and aft, along the roof of the lower deck for nearly its whole length, one on each side of the great wooden central engine-room casing; each one measures in length 147 feet, in breadth, 1 foot 7 inches, and in height, 9¼ inches; the sides are perforated by numerous quadrilateral apertures, set diamond-wise, 12 on the inner, and 28 on the outer one of each; these are 4½ inches square, closed by fine iron wire gauze, and shelved in so as to become smaller openings, about 2½ inches square, where free they communicate directly with the interior of the shaft, and are the means whereby foul air is received within, or fresh air propelled from within the interior of the apparatus.

Each shaft is divided into two distinct independent or equal portions by a central complete partition, and is arranged as regards the main ventilating tubes, the tank for the reception of condensed steam, &c., in the manner previously detailed under the head of Dr. Edmond's system of ventilation.

These side openings are small but numerous; if they had been made larger, in all probability the integrity of the shaft as an air tube, and its power of receiving or propelling currents of air along its entire length would have proportionably suffered; at first sight they appear to be rather too small to be thoroughly effective, but I trust soon to be in a position to present some accurate data of their practical working and utility.

The stancheons for cots are arranged with much more regularity and simplicity than those of the main deck; their mode of distribution is as follows:—Both before and behind the great central engine-room casing they are placed first in a double row, distant the outermost ones 2½ to 4 feet nearly from the sides of the ship, according as the latter became wider or narrower in regulating the shape of the vessel, and about 3 feet from each other; then comes a passage about 4½ feet wide between this and the next double row,

* *Vide* diagram annexed.

after which, centrally, is a still wider or main passage 5½ feet nearly, broad which serves to distinguish or divide the double rows (in pairs) of one side of the ship from those of the other.

In other words, there are two double parallel rows on each side of the deck, separated from each other by a passage 4½ feet broad, and from those of the opposite side by a main central passage 5½ feet nearly in breadth, whilst these double rows are again centrally intersected at right angles by a transverse passage 2½ feet wide, one for those in front of, and the other for those in rear of the central engine room casing, and sub-dividing them, as it were, into separate and smaller blocks or collections of stancheons for cots.

On each side of the central engine room casing the stancheons are disposed in single and incomplete files, parallel with the tables placed in these situations, distant from the sides of "casing" 9 feet 8 inches, and from the ends of the tables about 4 feet, so as always to leave a passage of that width, even when the latter are fixed in position and ready for use.

The fixtures for this deck, viz., cots, bed tables, stands for chamber utensils, &c., are of course of exactly the same description as those for the main deck. The accompanying plan of the lower deck and diagram of scuttles, coal ports, and portion of Dr. Edmonds' horizontal air-shaft, &c., will materially assist in the explanation and comprehension of all the above details.

The orlop or lowest deck* is situated between the one just described in previous report, and the hold, tunnel of bilge, &c., beneath; it extends from the front of the ship forwards, right back to the slope of the stern aft, is devoted altogether to the accommodation of various descriptions of stores, coals, water-tanks, &c., and for that purpose has been irregularly partitioned into numerous distinct compartments and subdivisions; it is narrower than any of the preceding decks, in consequence of the shelving in of the sides of the ship as they incline inferiorly to form the kelson, and is to be found only in ships of the first class and of large size and tonnage.

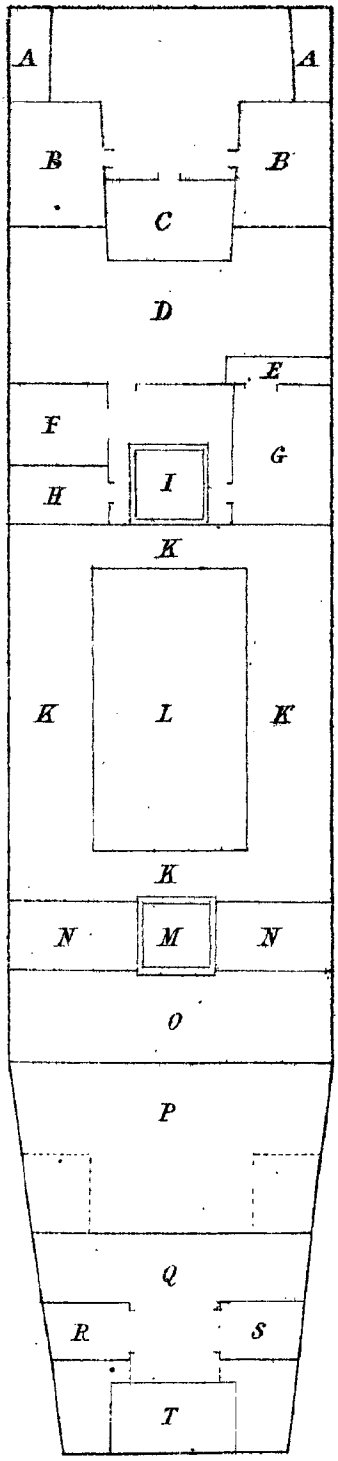
A reference to the accompanying plan will show the distribution of its different component parts, and render any detailed or elaborate account of these unnecessary, it being my object in this report to conclude with a few words the descriptive outline of the Queen of the South.

From before backwards are to be seen in order, two oil tanks, one on each side of a large central space designed for boatswain's stores, cable, &c., and situated in the "eyes" of the ship, these names indicate their use; immediately behind these are the ice-rooms or houses, one on each side of the deck, measuring 8 feet in breadth, 10 feet in length, and 8 feet 3 inches in height; their walls are 16 inches thick, their general arrangement of the usual description, they are capable of containing each about 25 tons of ice when properly stowed, and appear to be in every respect well adapted for their special purpose or design; hitherto we have had no practical experience of their working or suitability, as no supply of ice as as yet been shipped on board for hospital use; at present they are filled with spare sails and canvas, portions of rigging, &c.

Next comes the bread locker, and then the purveyor's store-rooms, admirably and conveniently designed, consisting of a general store, 35 feet long, by 19 broad, and 8 feet in height; a pack store on the port, a provision store on the starboard side, the former 14 feet long by 12 feet broad, the latter of the same dimensions, and leading into a smaller or "utensil" store, measuring 13 feet long by 6 feet broad; and lastly, a linen store on the port side, 12 feet long by 5 feet broad, all being as nearly as possible of the same height as the first, or general store, viz., 8 feet or thereabouts; these are accessible by means of the fore main hatchway of the lower deck previously described, and are faithfully delineated in the accompanying view or sketch.

After these appear in order a fore hatchway leading down into hold and bilge, the coal stores and bunkers around the engine room, another hatchway leading down to hold and bilge in this locality, and on each side the rooms before alluded to in a previous report, viz., that one on starboard side intended

* *Vide* plan annexed, scale 20 feet to an inch.



ORLOP DECK

A Oil Tanks
B Ice Rooms
C Bread Locker
D Purveyor's General Store
E Ditto Utensil Store
F Ditto Pack Store
G Ditto Provision Store
H Ditto Linen Store
I Hatchway to Bilge (Fore)
K Coal Stores
L Engine Room &c.
M Hatchway to Bilge (Main)
N Medical Reserve Stores
O Coal Store
P Water Tanks & General Stores
Q Wine and Spirit Stores
R Rum Store
S Powder
T Liquor Reserve Store

for sick officer's heavy baggage, and that on port side for reserve medical stores, &c., each measuring 13 feet in length, and 7 feet in breadth; they are accessible by means of the aftermain hatchway of lower deck, are correctly sketched in the annexed view, and both together capable of stowing from about 35 to 40 tons of stores, baggage, &c., if properly packed.

This deck is ventilated by means of the hatchways leading down into it from the lower deck, viz., the foremain hatchway, the openings of the central coal-receptacle and side bunkers when uncovered, the aftermain hatchway, and the hatchway leading to water-tanks, all of which have been before alluded to in the description of the lower deck, and represented in its plan; but besides these there are two metal ventilating shafts or funnels on each side, which open from this deck and traversing those situated immediately above, terminate upon the upper deck in cowls, which have been already described in detail in the first sanitary report of this ship; they are situated, the forward ones, in company with the "second" ventilating shafts of the lower deck, on a line nearly with the first of ths series of tables arranged on each side of the great central wooden engine-room casing of that deck; and the aft ones, pairing with the "third" ventilating shafts of the lower deck, on a line with, or opposite to, the forward angles of the aftermain hatchway, as already mentioned in a former report; at night time more especially, these hatchways or openings leading downwards to this deck, the holds, and bilge, are always kept carefully closed, and the cowls of the four metal ventilating tubes turned to leeward, in order to prevent any dispersion of foul air into the between decks through seams in the ship's sides, or crevices elsewhere, should fresh air happen to be introduced below by any accidental means.

A convenient arrangement has been adopted by the authorities on shore at Zoullah, whereby sick soldiers arriving on board bring with them only their helmets and waterproof bags, which latter merely contain the several items of wearing apparel which constitute the "kit" properly so called, their arms, accoutrements, bedding, waterproof sheets, &c., are all sent on board receiving ships (the "City of Agra" and "Indian Chief") in the bay, assigned for that special purpose, and the boat which takes on shore men when discharged from hospital, calls *en route* there, to receive whatever articles may have been deposited on board; thus the hospital ship is relieved of an amount of baggage, &c., for which she really possesses no suitable or sufficient accommodation.

On the outside of the large cargo port on the port side of the main deck, a platform has been suspended, and a ladder leading from it down to the sea adjusted, so as to enable patients to be received "directly" upon this deck, a plan which at times possesses manifest advantages; and the platform too has been utilised as a suitable place whereon to leave those "Fyffe's stool pans," the contents of which may appear desirable at any time to have preserved, for the inspection of the prescribing Medical Officer.

The washing of the upper deck every morning by the crew has been so regulated that one side only is done at a time, and finished completely before the other is commenced; in this way the convenience of those patients who are allowed up to enjoy the cool morning air is not interfered with, as they occupy first one side, then the other in turn, according as it becomes dry and ready for their occupation.

The "Queen of the South" has been frequently whitened on the outside with a mixture of chunam and size, which looks nearly as well as, and secures the advantage to be derived from, the relatively small heat-absorbing property of white paint, while it is much more economical. The fifteen bed-rests, which were supplied to the ship for serious or convalescent cases, were very useful; they were made of deal, and were of very simple contrivance.

Wind interceptors, such as are represented in the annexed designs, marked Nos. 3 and 4, ought to be provided for the scuttles of every hospital ship: circular ones to fit the circular, and square-bodied ones for the square-shaped scuttles of the decks. They are of immense benefit when the ship is in motion, or lays head on to the wind, or even when sprung on as much as six points on either starboard or port bow. By their means the breeze, which would otherwise pass by directly along the sides of the ship, is intercepted, its course deflected, and fairly conducted well into the interior of the decks or officers'

cabins, to the manifest improvement of both the coolness and purity of the contained atmosphere. There are a few of these, I believe, on board the "Golden Fleece," but the "Queen of the South" had not been provided with any of them.

Experience has proved, at all events in the case of the "Queen of the South," that a dead-house is quite unnecessary on board a hospital ship. When required, a temporary canvas enclosure has been erected on the port side of the upper deck, on a line with and opposite to the large funnel, and embracing one of the main wooden shoots which exists in that locality. This arrangement has answered all purposes admirably, and has afforded all the privacy, light, and accommodation required for *post-mortem* examinations.

In addition to the ventilation fixtures, whether of the ordinary or patent kinds, canvas windsails down the main hatchways to the lower deck, were used. The capacious mouths of these extending high over the awnings above, and trimmed with the greatest ease so as to catch fully the prevailing wind, have always afforded a strong down-current of fresh air.

In some of the ships chartered at Bombay, a primitive but effectual mode of ventilating the troop deck has been adopted, viz., several planks have been removed altogether, for a considerable portion of their length, from the floor of the upper deck, producing thereby quadrilateral continuous openings or deficiencies; one large one generally on each side, which are boxed over by planking, and fitted with a lid or top moveable on hinges, so as to be opened or shut at pleasure, and in the latter state used as a seat or bench, in the former as a ventilating opening, down which, at intervals, a canvas windsail could be adjusted, thereby converting portions of the space into "down-takes," and the intervals between the windsails into "up-takes," as occasion might require. This mode of cutting the upper deck, when carried to any extent, however, must tend to weaken the compact strength of the vessel.

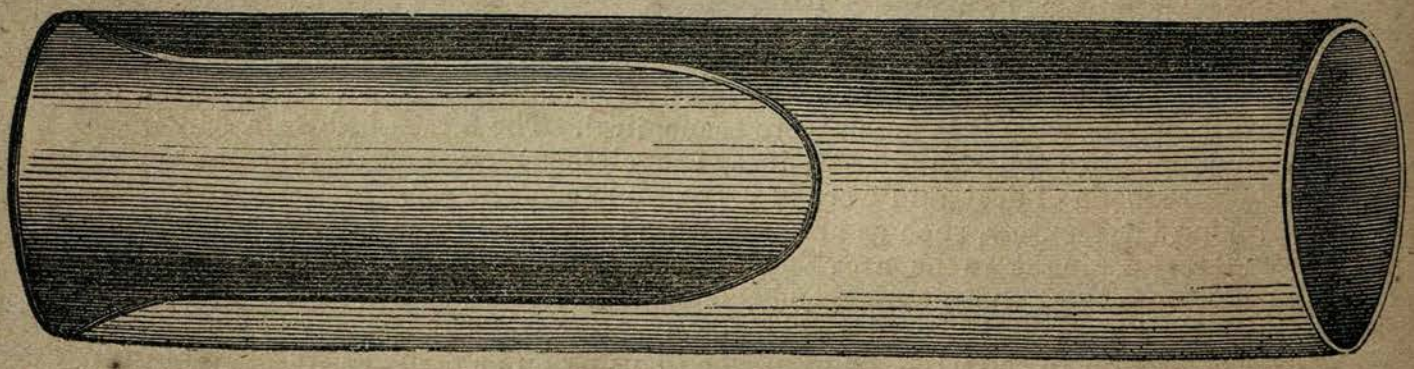
Live stock,—as bullocks, sheep, and poultry,—ought never to be permitted on board a hospital ship, when on duty in port for either hospital or saloon purposes—in a tropical climate especially.

The following are amongst the more obvious objections to the "Queen of the South" as a hospital ship, viz.:—As a steam ship a large central portion of every deck was occupied by the engine-room, machinery, &c. This diminishes the space as well as the ventilation of the hospital decks, whilst the additional heat which is produced when condensing fresh water, especially in the tropics, is a very serious objection.

When a vessel is to be used as a stationary hospital, the presence of the ship's officers and crew on board is objectionable as being unnecessary. The Medical and Purveyor's Staff should be the only officials permitted to occupy the ship whilst employed as a stationary floating hospital. Otherwise care must be taken to cut off completely the connection between the hospital main deck and the forecastle with its compartments when used by the crew.

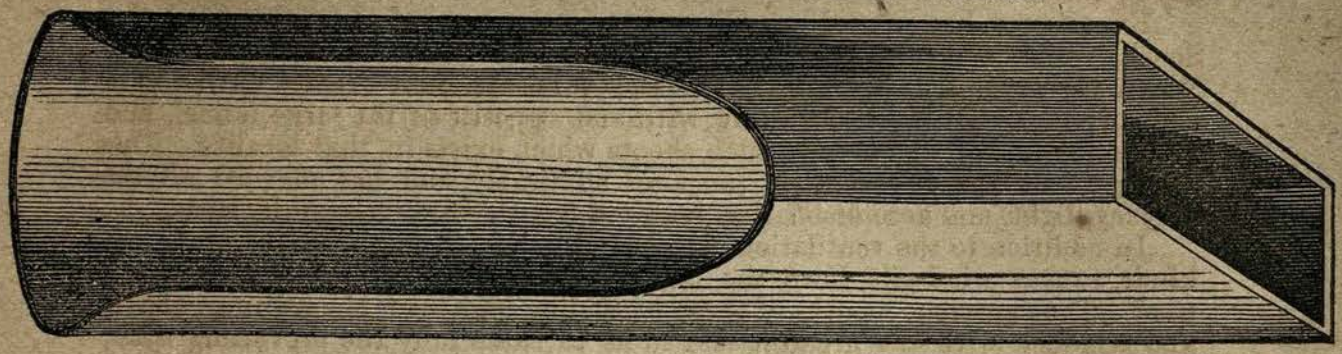
No. 3.

CIRCULAR WIND INTERCEPTOR FOR CIRCULAR SCUTTLES.



No. 4.

SQUARE BODY CIRCULAR TUBE FOR SQUARE SCUTTLES.



APPENDIX No. LV.

A SKETCH OF THE MEDICAL HISTORY OF HONG KONG, DURING THE FIRST FIFTEEN YEARS OF ITS OCCUPATION.

By N. HEFFERNAN, M.D., Deputy Inspector-General of Hospitals.

HONG KONG was ceded to Great Britain in January 1841, and in August of the same year the garrison was formed by a force of about 1,478 men, Europeans and Asiatics, left by Sir H. Gough when he proceeded to the North. At first these men were mostly in ships in the harbour, and the Europeans continued there during the rest of the year. The Asiatics were landed, and the greater part of the daily duty fell on them. Huts, made of bamboo and matting, were soon built; and early next year the troops were all landed. The huts afforded very little protection, either from the heat of the sun or from wind and rain, and the sides were so thin that the light could be seen through them. The accommodation was also insufficient, and the overcrowding was very great, even for that time, when the necessity of space and air was not so well understood.

Great sickness and mortality soon set in. It commenced in the Cameronian Depôt * (470 strong), which arrived from England, after a long voyage, on the 7th June. These men were located in huts at West Point, and so much sickness occurred among them that a Court of Inquiry, of which Major-General Lord Saltoun was President, was assembled to examine and report upon the cause of it. This Court found the accommodation afforded to be so inadequate, that, to use the words of the Report, "the men's cots were placed with a space of not more than three inches between each, all along the side walls, and with a double row touching one another down the centre of the whole of the buildings."

Up to the end of June only 27 deaths had taken place among the European portion of the garrison, but 45 died in July, and 48 in August, out of about 600. In the year 1843 the number of deaths was 368, or upwards of 39 per cent., of which the 55th lost nearly 46 per cent., and the 98th 22 per cent. Of 71 commissioned officers who were on the island, 7 died in this year, or nearly 10 per cent. The European portion of the garrison at this time consisted of a wing of the 55th, the 98th Regiment, and some Artillery and Engineers.

The 98th Regiment had been less than a year at Hong Kong, but is described by Captain Bruce, Assistant Adjutant-General, as being in a very debilitated state. A good deal of this was caused by influences acting on it before it came into garrison at Hong Kong.

He says, "Between the 11th December, 1841, the date of its embarkation from England, and November 1842, when it landed in Hong Kong, the regiment lost 253 men out of 770. This great mortality commenced at Chingkeang-foo, 21st July, 1842; and no doubt arose from causes, the effects of which not only continued in operation during the succeeding year (1843), when the men had little duty to perform, but also revived with increased virulence during the past year (1844), when the duties of the regiment were comparatively severe.

"The heavy losses sustained by this corps, prior to its landing at Hong Kong, were attributed by a Court of Inquiry to the following causes:—

"1st. The crowded state of the ship 'Belleisle,' in which the 98th came from England, and particularly the heat and confined atmosphere of the orlop deck.

"2nd. The great length of time (214 days) the regiment remained in this crowded state of confinement, and the long continuance of salt diet, consequent on such a voyage.

* This depôt must soon have been removed, as I can find no trace of the 26th Regiment anywhere else in the reports.

"The 'Belleisle' is about 1,700 tons burthen, and, including a detachment of Royal Artillery and the ship's company, brought out 1,278 persons. The evils arising from this state of things were still further aggravated by the manner in which the vessel's deck was encumbered with provisions and baggage, for which there was no room in the hold.

"The circumstance of their being no casualty among the officers, while the men were dying in such numbers, was ascribed, by the Surgeon, to the superior accommodation and food they enjoyed; and affords additional proof that the mortality amongst the men arose from the causes before mentioned.

"It should also be remembered, in reviewing the casualties of this year, that a portion of the Royal Artillery were likewise men whose constitutions had been tainted by the privations endured in the 'Belleisle,' and that the wing of the 55th Regiment was composed partly of men who had suffered up the Yeang-tse Keang, and partly of recruits only recently arrived from England."

In June and July of this year great sickness and mortality again set in among the European troops.

On the 15th July a Medical Committee was assembled, by order of Lord Saltoun, to report on the causes of the sickness and mortality amongst the 55th at West Point. Subjoined is the opinion of the Committee:—

"1st. In the early part of the month of May an increase was evident in the number of fevers admitted, but at that time they were not of a serious nature or dangerous tendency. Towards the end of the month, cases of severe remittent and continued fever began to prevail, and have occurred almost daily up to the present time.

"2nd. The average strength of the detachments at West Point, from the 20th May to 15th July, has been about 250 men. The daily admissions have varied from 3 to 10. The total number of all diseases, during the above period, has amounted to 408, of which 294, or 72 per cent., have been cases of fever. The casualties from fever have been 25; of other diseases 14; most of these were chronic cases of long standing.

"The number of officers with the detachment was nine; all have been sick except two, and two have died. The appearance of men out of hospital is far from favourable: they are pale, emaciated, and weak; relapses amongst them are excessively frequent, convalescence tedious, and recovery imperfect; and this applies in an especial manner to the recruits who have last joined.

"3rd. With regard to the causes of this sickness and mortality, the Committee are of opinion that the characters of these fevers are those generally ascribed to malaria; that the most apparent sources of malaria in this neighbourhood are two ravines, one on each side of the barracks, at the bottom of which, and close to the brooks in their centre, there is abundance of rank grass and exuberant vegetation, and in which ravines there are a few cultivated terraces where water may occasionally become stagnant; but these seem insufficient to account for the great severity and extent of the sickness. At the same time no other source of malaria is apparent; and although probably the faulty construction of the barracks,* and their being very much shut in from the south-east breezes, as well as the long march, under a hot sun, of the guards returning from town, and the nature of the duty (the men being on station or regimental guard every third night), doubtless are powerful causes of disease; but it is also their opinion that some other cause is in operation which cannot be detected."

That the Committee was powerless to suggest any remedy for the existing state of affairs is evident, as the mortality continued, and amounted for the year, among the European troops, to 368 deaths, or at the rate of 392 per 1,000 of average strength, being the greatest rate of mortality in any year since the colony of Hong Kong has existed.

This is not surprising, as all the elements for the production of disease, that will be pointed out hereafter, then existed in their greatest intensity. Early in 1844, Major-General d'Aguilar, who succeeded to the Command, sent the 55th Regiment to England, as it was reduced by disease to a most deplorable

* These barracks were soon given up. The situation of them is now considered one of the most healthy at Hong Kong, and the most fashionable private houses built in that direction.

state of inefficiency. The European portion of the garrison was made up by a detachment of the Royal Artillery, a few of the Royal Engineers, and the 98th Regiment. The 41st Madras Native Infantry was also sent away, and was relieved by the 4th. Unfortunately this latter was a sickly regiment. Captain Bruce says, "In the 4th Regiment the garrison gained no acquisition of strength. This corps, like the 98th, landed at Hong Kong in a sickly inefficient state, having lost by death and invaliding at Singapore, during the previous twelve months, 287 men. It was impossible, under these circumstances, to afford to the 98th that abatement of duty which the extensive sickness and general lassitude of the corps so much required. Consequently during the most sickly months, although the greatest efforts were made to reduce the guards, the wing of the 98th at Victoria had rarely three nights in bed, and sometimes not two, whilst the Sepoys were frequently on duty every alternate night. Had it not been for the continual reinforcements drawn from Chuck-choo, where the head-quarters of the regiment was stationed, the detachment at Victoria must have melted off the roster altogether." As yet, no proper barracks or hospitals had been built Captain Bruce further states, in the valuable Report I have so often quoted from,—

"During the year repeated attempts were made to obtain a suitable building for this service (Hospital), and the General even went so far as to order a Committee of Medical Officers to examine every house (including his own) rented by Government, and to select whatever building they might consider adapted to the purpose required. Notwithstanding all these efforts, the year rolled over without the desired object having been obtained." . . . "Previous to the middle of this year there was no fit site available for military buildings, but about that period his Excellency the present Governor, gave up, at the request of the Major-General, a piece of ground which the Commanding Royal Engineer had selected as the best adapted for barracks." . . . .

"A site having been likewise obtained for a permanent hospital, the work of erecting substantial buildings for the troops at last commenced." . . . . Like the last year for European troops, this year for Asiatic troops had the unpleasant pre-eminence of being the most fatal year either before or since, the deaths having amounted to 154, or in the ratio of 252 per 1,000 of average strength. It was also a bad year for the officers, seven out of 74 having died, and 16 been sent from the island on sick certificate. This was attributed at the time to the exposure undergone by the officers going to and from barracks, as it was found impossible to procure quarters for them adjacent to the men.

1845. 1st January to 31st March.—Previous to this time the returns are made out for the whole year, being taken from the records of the Adjutant-General's office, but in this year they commence on the 1st April.

During the first three months of this year there is a confusion in the returns, caused by the above circumstance, as well as by the departure of the 98th, one wing of which left in March, and the remainder early in April, and by the arrival of the 18th Royal Irish, some from England and some from Chusan. Nothing of any consequence occurred in the interval, and it is altogether left out of the Tables at the end of this paper.

During the year 1845-6 the mortality was nearly the same as in 1844, a little less, but the scene of the greater part of it is changed to a place called Chuck Choo, or Stanley. The military post of Stanley occupied a narrow neck of land connecting a small peninsula with the south side of the island of Hong Kong, having a small shallow bay on each side. It is open to the wind on both sides, and has the full benefit of the south-west monsoon; the absence of which from Victoria on the other side of the island has been made the excuse for, or explanation of, the unhealthiness of the head-quarter station.

On the 10th April a detachment of 129 men of the 18th Royal Irish, called Captain Payne's detachment, marched to Stanley from Saiwan, where they had been stationed since their arrival from England in the previous December.

The left wing of the regiment, 293 strong, followed on the 14th May, having just arrived from Chusan. Small parties of convalescents arrived occasionally from Victoria, and were sent there, and companies were interchanged three times between Stanley and Victoria.

Dr. Kinnes, Deputy Inspector-General, who makes a special report on the subject, states that from the different changes that occurred, the average strength of the detachment between the months of April and November was

about 300; out of this number there were the following numbers of admissions and deaths:—

27	comprising	20	cases of fever were admitted and	0	died in	April.
100	,,	38	,, ,, ,,	3	,,	May.
121	,,	67	,, ,, ,,	2	,,	June.
115	,,	84	,, ,, ,,	6	,,	July.
200	,,	176	,, ,, ,,	12	,,	August.
170	,,	131	,, ,, ,,	7	,,	September.
157	,,	119	,, ,, ,,	13	,,	October.
67	,,	41	,, ,, ,,	13	died to	19th Nov.
957		676		56		

"It hence appears that if the whole detachment had been equally susceptible and equally exposed to the causes of disease, every individual would have been at least three times in hospital, and had at least two attacks of fever in the short space of seven months."

"Of the 56 deaths, 32 were caused by fever, 14 by diarrhœa and dysentery, three by cholera morbus, two by pulmonary consumption, and one respectively by erysipelas, apoplexy, and injury of the head."

"Of the fatal cases in hospital, 31 belonged to Captain Payne's draft, originally 131 in number, but now, 11 months after its arrival in the Command, reduced by these and two other deaths at Saiwan, or Victoria, to 98 men, of whom eight only have been sent to Victoria for duty, and 90 remain mostly sick or convalescent at Stanley. These men can generally be distinguished in the ranks from the older soldiers and more recent draft by their more weakly appearance and sallow, sickly complexion, though many others of the detachment are also in greatly reduced health."

In his report for the quarter, 1st July to 30th September, Dr. Kinnis gives the following proportion of admissions and deaths of the 18th Royal Irish at the different stations:—

Stations.	Per 1,000.	
	Admissions.	Deaths.
Victoria	299 or 590	8 or 15·7
Stanley	483 1,700	26 89·7
Saiwan	153 2,265	2 29·9

The whole regiment being then in Hong Kong, one wing at Victoria, one at Stanley, and a small detachment at Saiwan.

In his report on the troops at Stanley in November, Dr. Kinnis suggested that a large proportion of the men should be embarked and sent to sea for a month, and that the remainder should be brought in to Victoria as soon as practicable. The sickness and mortality of this year are both very large, and as far as the European troops are concerned, were owing to the influence of two causes, one was the state of a particular body of men that arrived from England in the "Java" transport called Captain Payne's draft. These men continued sickly all through the year. The circumstances of their voyage are not noted, but their is a probability that the seeds of disease were laid then, as has been noticed before in other instances. The other cause was the bad construction of the barracks at Stanley, which were so damp and ill ventilated that they were evacuated, the men put into officers' quarters, and the number of men stationed there reduced to a very small number. The years 1846–7 and 1847–8 were the healthiest both for Europeans and Asiatics since the first occupation of Hong Kong. This was owing to increased accommodation, both the North and Murray Barracks having come into occupation in the former year; and the non-arrival, at least until the end of the second year, of fresh troops debilitated by the effects of over-crowding on board ship.

The new European Hospital was first occupied on the 13th February, 1846, the Murray Barracks on the 8th January, 1846, and the North Barracks in the course of the same year. The troops were now for the first time housed in

barracks built for the purpose on anything like a good plan; still so little was the value of space in a tropical climate understood, these two barracks were supposed to have ample accommodation for 876 European non-commissioned officers and soldiers, whereas at present they are considered fit to containonly about 500. In 1847–8 a demonstration against Canton was made by Major-General D'Aguilar, but the troops were absent for a very short time, had no fighting or sickness, and therefore the statistics of the year do not appear to be influenced by it. The 18th Royal Irish left Hong Kong for India on the 29th November, 1847.

The regiment lost 41 men by death during the period of the year in which they remained in Hong Kong. Dr. Fergusson, Deputy Inspector-General, reports, "It would appear that several types of fever prevailed, to such an extent in the 18th Regiment from the early part of June to the 16th of July, as to have almost deserved the name of an epidemic in the corps; but the number of admissions gradually declined from the latter date until the end of August, when the number, 56 on the last of June and 1st July, was reduced to 9 on the 1st August." He also says, "It is, perhaps, a singular fact that the bowel affections in this corps increased, and decreased with those of fever, but by no means in an equal degree. 44 on the 9th July and the two succeeding days was the highest number, and it was reduced to 13 on the day prior to embarkation." This sickness in the 18th, who were quartered in Murray Barracks, was attributed at the time to the exposure of fresh surface in cutting down a hill near the west end of the barracks, for the purpose of forming a parade ground. Dr. Fergusson is led to adopt this opinion by the fact that the 95th lately arrived, and the 42nd Madras Native Infantry both quartered in other barracks, were free from unusual sickness at the time.

The volume of the Historical Register, containing the whole of the annual and quarterly reports for the years 1848–9 and 1849–50 has been lost, so that I am unable to give any particular information as to the causes of sickness and mortality. This is the more to be regretted, as the former is the fourth in intensity of sickness and mortality of all the years included in this paper.

I have collected, however, from other sources the numbers of admissions and deaths, which are given in the Table at the end. The 95th Regiment arrived from Ceylon in May 1847, relieving the 18th Royal Irish, who proceeded to India; this regiment remained at Hong Kong less than three years, as the 59th Regiment arrived from England to relieve it on the 11th February, 1850. The year 1850–51 was a very unhealthy one in Hong Kong for the troops, both European and Asiatic, coming third in degree of mortality. The Europeans out of an average strength of 630, had 4,404 admissions, 3,480 of them being fevers, and 139 deaths, of which 93 were caused by fever. The Asiatic troops suffered nearly as much. No distinct assignable cause for this state of affairs is stated in the reports, except a supposed increased malarious constitution of the atmosphere. Dr. MacAndrew states in his report written at the end of the year: "The past year has, I believe, been unequalled for the prevalence of sickness in Hong Kong, yet the mortality has been remarkable only among European and native troops." In another part of she same report, however, he states: "Enquiring into the health of the civil officers of the Government, I am informed that almost without a single exception they all suffered, and some in a severe degree, from the remittent fever of last year." The Colonial Surgeon thinks there could be no doubt that a specific atmospheric influence existed last year, and which created the endemic, particularly during the tranquil state of the atmosphere which often existed." Comparing these two statements, it would appear that the causes that produced slight attacks of fever among the civilians, had the effect of producing great mortality among the soldiers. There was one cause that evidently predisposed the men of the 59th Regiment to disease, viz., the period of their arrival; the regiment landed in the middle of February, and the weather began to get warm before the men had had time to get acclimatised. There were two other causes acting, which although common most likely to all years at that time, predisposed the men to yield to the epidemic influence of the year, viz., excessive night duty and want of cubic space in the barracks. I find a return appended to the annual report, in which the privates of the 59th Regiment are stated to have had an average of three and four nights in bed. This is too much night duty, especially in an unhealthy year. Of cubic space I have already spoken

in page 600, when mentioning the new barracks. There is no notice taken of the subject in the returns and reports, but no doubt the barracks were occupied on the old scale of space.

After this time there has not been any very remarkable period of sickness or death, though the rate of mortality still continued much too high, having varied during the next five years from 40 to 64 per 1,000 of average strength. Still there was a gradual improvement in the general health of the garrison.

Dr. Bradford, in his Annual Report for 1856–7, speaking of the 59th Regiment, says: "I reported in October last that, from careful personal observation, I could confidently assert that the bulk of the regiment consisted of young men of robust frames, and quite as effective as any men would be who had served an equal time in any other tropical climate. Further observation has fully confirmed this opinion."

The following return, however, signed by Colonel Graham, and given in his report soon after by Dr. Gordon, will show what sufferings the regiment went through before it attained the state of efficiency described by Dr. Bradford.

(*See* Appendix No. III.) Upon a review of the sefirst 15 years of the life of the colony, it will be seen that the first four years were an almost unrelieved scene of disaster, and that the years 1848–9 and 1850–1 were nearly as bad.

These two latter years were the periods following the arrival of the 95th and 59th Regiments respectively, showing how all the causes of illness become intensified on the arrival of a large number of unacclimatised men.

The diseases that prevailed generally, and caused so much loss to the garrison, were of the miasmatic orders, fever being the most common, diarrhœa and dysentery coming next in importance. The fevers were intermittent and remittent, and evidently of the character produced by malarious exhalations, but were, I think from the descriptions, more of the remittent type. Some of the Medical Officers who had been in the West Indies distinctly state that they were of the same description as the ordinary fevers of the West Indies. In bad years they were fatal very quickly; from two to six days are mentioned as the duration, and in a few instances the time is counted by hours; in years of less intensity they were less severe, but the patients were liable to frequent recurrences of the disease, until at last the constitution was worn out.

Diarrhœa and dysentery were the next in importance; they sometimes came on after attacks of fever, but at other times prevailed independently. Generally speaking, however, all these orders of disease prevailed simultaneously, fever, however, always taking the lead in importance. The mortality from other diseases was small, but it is stated on more than one occasion that pulmonary affections were very fatal in proportion to the admissions, which were few in number. The causes that produced the disastrous effects described above were evident.

Regiments and drafts arriving at a bad time of the year after long voyages, during which they had been badly fed and overcrowded, thus laying the foundations of illness in their constitution before they were exposed to malarious influences, and other causes of disease incidental to the place itself, bad barrack accommodation and insufficient cubic space.

The early history of the colony, especially the disasters of the first four years, point this out forcibly. As Hong Kong was a new possession, and there were few or no buildings that could be hired, temporary barracks were run up in a hurry, subject to almost every possible defect. They afforded no protection against sun or rain, were much too small, were not sufficiently raised from the ground, and were often situated close to ravines. The results need not cause any surprise.

Excessive duty, two, three, and four nights in bed, is frequently given as the proportion experienced by the men; rank vegetation surrrounding the barracks, and fresh cuttings of earth in their neighbourhood. Of course, in the early period of the colony, roads were being made, hillocks cut down, and foundations dug for private houses and public buildings, so that this cause was in full activity.

Exposure to the sun, to which troops badly housed and uncomfortable in many ways, would be very careless of avoiding.

Malarious influences, acting with redoubled effect on men subject to the

above predisposing causes. The remedies for the above will at once suggest themselves to anyone, but I may be permitted a few remarks in conclusion.

All troops destined for tropical service should be considered undergoing a system of preparation at the very commencement of the voyage. They should be well selected, have ample room and good food during the voyage, and their arrival ought to be timed so as to give them the whole winter to settle down and get accustomed to the climate.

All barrack rooms should be raised on an open archway basement, and be surrounded by a verandah 12 feet wide; 1,000 cubic feet should be allowed to each man. Punkahs should be used at night in the hot season. The ground surrounding and between the barrack buildings should be covered with impervious cement. Healthy trees and bamboos should be planted about them, but no undergrowth or brushwood allowed.

Every soldier should have seven nights in bed. When the numbers do not allow of this, sentries should be discontinued, and native watchman hired to replace them.

In case of epidemic disease or increased sickness, the troops should be embarked on board ship and sent to sea.

The plan of hiring civilian buildings for the troops is expensive and very unsuitable, as they never make good barracks or hospitals, and are always deficient in ventilation.

The plan of encamping men in huts and spreading them over the country is unsuitable to Hong Kong, owing to the nature of the soil, and its tendency to exhale malaria. Appended are two returns, giving the rate of sickness and mortality for each year, one for the European troops, and one for the Asiatics. (*See* Appendix Nos. I and II.)

In drawing these up, I have carefully excluded all troops serving in other parts of China, and confined myself to those at Hong Kong, with the exception of the short expedition to Canton in 1847, but this was formed of the troops at Hong Kong entirely, and lasted for a very short time, after which the troops returned to Hong Kong.

Appendix No. I.

Return of the Sickness and Mortality at Hong Kong—European Troops.

Years.	Average Strength.	Average Daily Sick.	Total Admissions.	Total Deaths.	Ratio per 1,000.		
					Average Daily Sick.	Admissions.	Deaths.
Aug. to Dec. 1841	953	135	..	19	..	..	..
1842	655	158	..	165	241	..	251
1843	937	224	..	368	239	..	392
1844	1,057	151	..	211	142	..	199
1845-6	900	117	2,618	147	129	2,910	163
1846-7	775	102	1,566	30	132	2,008	38
1847-8	1,102	111	2,148	76	100	1,922	71
1848-9	666	68	2,288	132	102	3,435	200
1849-50	875	78	2,995	53	89	3,422	60
1850-1	630	112	4,404	139	177	6,990	220
1851-2	623	78	2,719	40	125	4,364	64
1852-3	636	54	1,843	26	84	2,897	40
1853-4	627	..	2,383	33	..	3,800	52
1854-5	512	60	1,774	22	117	3,468	43
1855-6	509	61	1,691	31	119	3,322	61
1856-7*	..	..	..	..	..	..	..
1857-8*	..	..	..	..	..	..	..

* Hostilities broke out at Canton and troops were sent. Statistics confused in consequence.

APPENDIX No. II.

Return of the Sickness and Mortality at Hong Kong—Asiatic Troops.

Years.	Average Strength.	Average Daily Sick.	Total Admissions.	Total Deaths.	Ratio per 1,000.		
					Average Daily Sick.	Admissions.	Deaths.
Aug. to Dec. 1841	640	183	..	44	..	..	..
1842	490	87	..	97	177	..	197
1843	558	93	..	64	166	..	114
1844	610	52	..	154	85	..	252
1845-6	688	68	1,648	72	99	2,395	105
1846-7	847	92	2,129	65	109	2,514	77
1847-8	1,130	163	3,208	78	125	2,838	66
1848-9	732	74	1,738	55	101	2,477	77
1849-50	567	48	1,290	18	84	2,275	31
1850-1	399	51	1,438	45	127	3,607	113
1851-2	396	34	718	29	86	1,813	73
1852-3	366	25	549	33	68	1,500	92
1853-4	289	..	419	18	..	1,449	62
1854-5	76	6	181	2	79	2,407	26
1855-6	90	13	380	12	144	4,222	133
1856-7*	..	..	..	..	..	..	..

* Hostilities broke out at Canton and troops were sent. Statistics become confused with other places.

APPENDIX No. III.

59th Regiment.—Strength of Service Companies.

Arrived at Hong-Kong in 1849	25 officers,	642 men.
Joined from England in 1850	2 „	0 „
„ „ 1851	4 „	155 „
„ „ 1852	4 „	101 „
„ „ 1853	7 „	125 „
„ „ 1854	6 „	108 „
„ „ 1855	5 „	286 „
„ „ 1856	8 „	226 „
„ „ 1857	0 „	1 „
Enlisted at Head-quarters, and transfers	0 „	16 „
Total landed..	61 „	1,660 „

Died between 17th June 1849 and 17th June 1857 (8 years)	5 officers	416 men.
Killed (4 accident 1 suicide)	0 „	7 „
Deserted	0 „	138 „
Discharged and transferred	0 „	68 „
Sold out and exchanged	15 „	0 „
Invalided	20 „	397 „
Deduct	40 „	1,026 „
Remain effective 17th June 1857	21 „	634 „

(Signed) HOPE GRAHAM,
Colonel and Lieut.-Colonel Commanding,
59th Regiment.

APPENDIX No. LVI.

TRANSLATION OF A PORTION OF AN OLD CHINESE TREATISE ON THE SUBJECT OF ZYMOSIS.

By J. Lamprey, M.B., Surgeon 67th Regiment.

When first in charge of the hospital for Chinese, instituted at Tien-Tsin by the British Army of Occupation in the North of China in 1861, I was much puzzled to understand the meaning of the term Wan E, applied by the Chinese attendants to a case of erysipelas, at the time under treatment; and, on inquiry, was informed that the case did not come under the head of Fung, or wind, as I expected, it being the custom of the Chinese to refer a disease to some one of the four influences—wind, cold, heat, and humidity; in short, this is the first point to be determined by the native doctors before they commence to treat a case, and the question is so generally understood, that the commonest person feels himself quite competent to determine it.

Shortly afterwards a case of remittent fever of an urgent character was admitted, when I was much surprised to find the term Wan E applied to this case also, and was informed that there were several similar cases then prevalent in the city. I now began to understand that the term was meant to imply epidemic, and following up the inquiry, I found the Chinese treatise now under consideration.

The translation of a portion of this work, whilst it afforded me the opportunity of pursuing the study of the Chinese language, gave an insight into the medical literature of the Chinese, and showed that the subject of zymosis, now occupying the attention of the medical profession in Europe with such deep earnestness as to make it appear almost a new branch of medical science, was already entertained by the Chinese centuries ago.

(Translation.)

Preface.

Regarding diseases of a zymotic character*, as distinguished from those attributable to wind, cold, heat, and humidity; doubtless Nature has some uniform way of originating those unnatural vapours which affect our bodies, whilst the ways of their manifestation are various.

This mode of treating the subject of zymosis is absolutely required for our assistance, having hitherto patiently submitted ourselves to epidemic visitations no clear explanations of the subject being offered, unless we except Yung Ching's treatise on rigosis†. In accordance with the laws, that first of all, the sun‡ influences the moon, or else the stars, or the three influence

* The Chinese term *Wan E* bears the translation, zymosis or zymotic, and strange that the character for fermentation should be *wan* also, and made up of nearly the same radicles, the radicle for wine being introduced when it is meant to signify fermentation.

† Sheung Pon literally means pernicious cold, but which bears this translation.

‡ Tai Yang means the sun; it is a figurative expression, implying the great forces of nature, which pervade all matter and organism. It is difficult to understand by Chinese explanation, either oral or by their books, their notions of Yin and Yang; we might also trace, however, a crude idea of "polarity"; at least, this symbol of the "eight diagrams" would lead us to infer this. A subject of considerable interest not yet properly entered upon by sinologues.

each other. In like manner the body is influenced by external agencies, such as wind, cold, and so forth. Is this not in accordance with the law of influences?

Zymosis is quite a different matter. To enumerate all the variety of views arising from this treatise of Yung Ching, would make no end of confusion. Suffice it to say, rigosis is merely an expression which has reference to a particular kind of zymotic disease, very little used by the medical profession; it is found in treatises, essays, in innumerable volumes of books on the subject of rigosis; whereas the examination of the diseases and close inspection shows that they are zymotic in character. On the other hand, only one or two in a hundred could be recognised as true rigosis; it is not right to permit two things so unlike each other to be called by the same name.*

I, in common with others, at first spoke of the diseases of spring, summer, and autumn as being zymotic, and rigosis as belonging to winter; but the experience of years shows that zymosis may prevail at all the four seasons; and regarding rigosis, I endeavoured to recognise it when there was severe rigor, although there was headache, aching pains in the body, chilliness, no perspiration, feverishness, all evidences of the influence of the (Tai Yang Sun). On the 6th or 7th day, the patient fails to recover, the disease not having as yet influenced the internal vessels. On administering a dose for dispersing vertigo, one perspiration occurs, and the disease is cured. Allowing an interval to elapse without medicine, it may even spontaneously disperse itself; it is by no means always the case that because perspiration does not take place, jaundice, wandering talk, raving restlessness, violence, and such like symptoms, must occur.

In all cases of common cold the sickness is of a light and trivial nature, not true rigosis—it is a rigosis cold, brought on by wind or cold, not regarding its being slight or heavy; in short, cold of a chronic form is a rare form of rigosis. Moreover, rigosis and zymosis are both susceptible of atmospheric and terrestrial influences in a separate manner; in this respect there is a marked difference.

It may be clearly seen that rigosis is an extremely small affair. Yung Ching, taking rigosis to be a disease of an urgent character, errs in the treatment of his patient being flurried, many are thus placed in jeopardy. Hence the reason for producing this treatise is to benefit the world for future ages, diligently expounding for humanity's sake how to draw the line in cases of rigosis as well as zymosis—the severe forms of disease and the milder ones, perhaps also inculcating, while proclaiming to the world respecting zymosis, much relating to rigosis; and, on the other hand, rejecting what is not in accordance with reason while speaking of the symptoms of rigosis.

Yung Ching derives his treatise from a different source. Many years before war, fire, and smoke existed, rigosis was the remains of some long-forgotten vague term. Wong Sowoo started a collected treatise, erroneously entitled "A Standard Treatise on Zymosis," by no means a long-forgotten vague term—this is manifest.

In the reign of Tsung Ching, in the year 1641, the zymotic malaria diffused itself at a place called Che Hien, in Shantiung province, in a direction north and south, affecting many in an extraordinary manner. At the time of the 5th and 6th moon there was a great increase of sickness; it is probable that the whole of the community were affected before there was a cessation of the epidemic.

At that time the physicians in error treated the sick by the rules of the rigosis theory, not discerning the dangerous character of the illness; either the sick family listening to erroneous opinions, assumed that recovery would take place on the seventh day, and found that on the 14th day the patient was not cured, being as sick as at first: while expecting the period appointed for recovery, death generally took place; or, perhaps, in a reckless manner administer some powerful dose of medicine, or employing stimulants and supports, mistaking their proper place, the patients died; or the physician, being brought to a stand-still, the family observe that he has not understood the case, being a person of doubtful intelligence; he is timid, employing mild

* Literally to point to a stag, and call it a horse.

remedies in severe and acute disease, supposing that now perhaps the patient is in no immediate danger, but then presently death occurred.

It frequently happens that that which excites disease may be of a light nature, a most fortunate circumstance for those attacked, or that which excites disease, is of a grave character in those instances as a consequence of bad treatment, needless death is always liable to occur.

Is it not lamentable to find that the ancient rules are not applicable to the treatment of modern diseases, so that the very ancient books contain no suitable information for the treatment of modern diseases? hence their remedies are not followed.

The physician makes no secret that he is confused, the sick man from the first is dangerously ill—being anxious for recovery—has recourse to medicine; his treatment is unmanaged, it is not the sickness which has killed him; forsooth, then it must be the physician that has killed him, or is his death owing to the loss of the books of olden days? Alas, for the records of a thousand years; but why need the people be grieved thereat, when I, though an obscure rustic, with close application investigated the principles of medicine so as to understand thoroughly the nature of the vapours which excite disease in our bodies, which enter our abodes, which hold fast to a locality, and which influence the transmutations of our bodies.

The correctness of my views can be at once tested by experience; they are carefully set forth and arranged as follows, hoping to obtain an excellent reputation by their soundness.

Suchow, 1642

Here follow two other prefaces, written by commentators, who endeavoured to get their name into notoriety as eminent physicians. The original work being held in great estimation by the Chinese, on account of the vast amount of common sense it contains.

INDEX.

Chap.

1. On Original Sickness.
2. First Indications of Zymosis.
3. The Determination of the Transmutations not Constant.
4. Urgent Symptoms Indicate Urgent Effects.
5. The Difference between Internal and External Complications.
6. How Ardent Fever manifests itself.
7. On Internal Constipation without Perspiration.
8. Diarrhœa with a Fleeting Pulse.
9. Diarrhœa with a Full Pulse and Diminishing Pulse.
10. Noxious Vapour (Malaria), its Concentration.
11. Diarrhœa Accompanied with Fever.
12. Diarrhœa with a Rapid Pulse.
13. The Cause of Symptoms of Relapses.
14. Convalescence after Sickness.
15. After Sickness.
16. With Close Attention to Expel Sickness by Purgation.
17. To Restrain the Blood.
18. Jaundice.
19. Uneasiness at the Epigastrium.
20. Rigosis Clearly Shown to be Zymosis.
21. Collected Discourse on Eruption and Excessive Purgation.
22. On Excessive Perspiration.
23. On Spontaneous Perspiration.
24. On Perspiration Occurring in Sleep.
25. On Perspiration with Delirium.
26. Eruptive Sickness (Exanthemata).
27. The Passage Downwards Dissipates the Ying.
28. Dispersing Downwards, should Support the Ying without using Gin Seng or Shuk.
29. How to Avoid the Use of Gin Seng; Previous Purgation shown to be Necessary.

Chap.
30. Occasional Laxatives Useful in Diarrhœa.
31. Regularity of the Bowels Opposed to Diseases Arising from Costiveness.
32. Regularity of the Bowels Opposed to Vomiting.
33. To Excite Perspiration when there is None.
34. To Stop Diarrhœa and to Move the Bowels Slowly.
35. With Medicine Rendered Senseless.
36. When to Cease given Medicine.
37. Cases of Protracted Senselessness having the Appearance of being Raving Mad.
38. Insensibility with Wandering Talk.
39. Having no Breath to Speak.
40. Different Medicines for Old and Young.
41. Concerning Rejecting Medicines for Enfeebled Respiration.
42. Concerning Rejecting Medicines of a Strengthening Character.
43. Concerning Cold and Chill Remedies.
44. On Defæcation.
45. On Micturition.
46. Patients at first Feeble, afterwards are Strong; at first Strong, afterwards Feeble.
47. On Pulselessness.
48. On Pulse Signs not to be Depended on.
49. The Patient Moribund.
50. How to take Advantage of Symptoms to Cure Disease.

Three Chapters are given as a specimen.

CHAPTER I.

On Original Sickness.

The cause of sickness of an epidemic character was formerly improperly considered in reference to the seasons, each season having its own particular vapour,* for instance, to spring belonged the warm vapour, and not the great chill vapour. To summer belonged the heat vapour, and not the great cold vapour. To autumn belonged the cold vapour, and not the great heat vapour. To winter belonged the chill vapour, and not the great warm vapour; are not these the vapours of the seasons, and the sickness of old and young being alike, that therefore it must be epidemic. My theory does not coincide with this.

Now is it not so that cold, heat, warmth, chill are the variable concomitants of each particular season, because wind, rain, a dull sky, and bright sunshine are ever making alterations: for instance, for the autumn to be hot there need be much sunshine; for the spring to be cold, there need be much rain; and generally speaking, in the usual course of nature, it does not follow that there must necessarily be zymosis to any great extent.

Rigosis occurring in the middle of summer may be excited by nature's ordinary vapours.

Zymosis is excited by nature's pestilent vapours.†

In the course of years there is sometimes a considerable prevalence of zymosis; at other times less; in one place there may be more, in another place less, of it. In the four seasons it may be sometimes increasing, at other times declining, according as the prevailing vapour may bring it to pass.‡

Regardless of age or youth, strength or weakness, or the power of resisting sickness, a noxious vapour§ enters the body readily through the nose or mouth, which accounts for the nature of its presence there, thus it may be internal, although not in the inner recess; or external, without being in the blood-vessels, fixed within the region corresponding with the dorsal vertebræ, avoiding the outer parts, regardless of distance from, or nearness to, the centre of the body, thus drawing a line of distinction between what is external and

* The word *che*, in Chinese, means originally the vapour arising from boiled rice; it also means an exhalation or vapour; Latin, *aer*.

† *Lai che*, pestilent vapours, or vapours that would give rise to a low typhoid character to fever, small pox, &c.

‡ This approaches to Sydenham's notion of the "Constitution of the year."

§ *Gno che* might be properly translated malaria. Gno means malus; Che means aer.

what is internal, not recognising one part external, the other internal; it is thus said the application of the acupuncture needle transfixing the true skin connects the external with the internal.*

The receptacle† of the great circulating vessels is situated at the centre of the body; the great circulating vessels all assemble together in the centre of the body, so that the vapour of the centre of the body can be spread out and circulated by means of the great vessels in the midst, conveying vigorous health throughout the members to every part, no matter how minute, and dispersing that which cannot be assimilated.

Generally speaking, the noxious vapour in the blood vessels is external, that in the centre recepticle is internal: hence the noxious vapour in the true skin ought to be the union of the noxious vapours of the vessels, and of the centre recepticle being part external and part internal.

Heat is the vapour of excess, filling and congesting some particular vessel of circulation. It can be made manifest what particular vessel is affected by symptoms; for instance, the overflowing and congesting of the region of the temples accounts for headache, pain in the nape of the neck, and pains in the lumbar region as if it were about to be bent in two.

Overflowing and congesting of the upper portion of the head (vortex) accounts for pain in the eyes and eyebrows, and stoppage of the nose; and overflowing and congesting of the parotid region accounts for pain in the side, deafness, ague, vomiting, and bad taste in the mouth.

Taking a general view we find the noxious vapour frequently affects the temples; next in order the top of the head; and lastly, the parotid region.

It is this noxious vapour‡ which enables heaven to bestow disease upon us, or cause us to be infected. It may affect the body in a different way although the sickness is the same.§

It is a common saying that the breath of man's mouth and nostrils is derived from heaven's breath.‖ This pure original breath inflating him, no noxious vapours can easily enter him. It sometimes occurs that the original breath is at times deficient, or respiration is interrupted, which accounts for outward noxious vapours getting the advantage of one; for instance, let us suppose three men on a foggy morning to set out on a journey, one not having eaten food dies, another having only taken some wine gets sick, the third having eaten a hearty meal is in good health. Is not the difference in the fate of these three men to be attributed to the zymotic noxious vapour, granting that the prevalent vapour was of a pestilent character, and not disputing that the original unpolluted breath, whether of strong or weak, or more or less resists prevailing sickness. There is no limit to such cases.

If the exciting cause of sickness is powerful, it strikes, and at once sickness is produced; or if the exciting cause is of a trivial character, in this instance the noxious vapour cannot overcome the original breath. The cause-producing sickness cannot abide, though it may come upon one famished with as much energy as upon one satiated with food.

The low-spirited noxious vapour causes anger. The natural breath protects from injury. The noxious vapours may at once extend and overflow the system, becoming an impediment to the subtle principle which governs the

* Chinese doctors have, from very remote times, laid great stress on the external and the internal, as applied to the body; but when they come to explain their theory, they are evidently, in our minds, utterly confused from want of a knowledge of anatomy; the internal vessels, or twelve ching, are utter nonsense. From want of a knowledge of anatomy, they are ignorant of the nature of the alimentary canal, or the circulating system.

† *Wai* means stomach as well as receptacle. The author hardly understood what he was talking about.

‡ Malaria.

§ There are three ways by which men may become diseased: the first is by *sham*, *i.e.*, to bestow as an inheritance; the second is by *yap*, *i.e.*, to enter as into a house; and the third is by *im*, *i.e.*, a term applied to dyeing clothes by immersion into dye stuff.

‖ A quotation from some of the ancient books; it corresponds with another notion of theirs, but which is at variance with ours, that "man is originally born pure."

gyratory movements of our organism. The *yang* vapour of our bodies is made to yield, and so accounts for the commencement of fever, because the yang has retreated to the inside it cannot reach the outer surface. At first there is piercingly cold rigor, which, when excessive, causes jactitation of the limbs. The yang vapour accumulating gradually, and exceedingly repressed at length, diffuses itself through the body: hence it yields, and inwardly and outwardly heat pervades. The result is simply heat not rigor, because the yang vapour has diffused itself. Subsequently, perspiration should ensue, though, perhaps, on the contrary, it may not ensue. This depends on the weakness or the strength of the attachment of the noxious vapour.

Immediately that perspiration takes place, it may be the perspiration of the outside of the flesh, if affected by the noxious vapour in the veins. One perspiration will be sufficient to disperse it.

Regarding the noxious vapour in the parts external and internal, supposing the external parts to be in a state of perspiration (the natural breath being in no ways impaired). The noxious vapour, however, deeply concealed in the system may be dispersed; therefore expect the concealed noxious vapours to withdraw gradually.

The vapour pervading the outer surface retreating inwards, forsooth, causes great commotion. The uncontaminated breath situated within makes use of the true skin as the means by which it permeates the outer surface. The excited commotion being stopped, heat is now restored. At this time the outward and inward having mutually communicated, a dripping perspiration ensues, the clothes become saturated with moisture.

The noxious vapour becomes dissipated by perspiration, which is called the perspiration of commotion, when now, the pulse becoming tranquil, the animal spirits are restored to a state of health, and at once the patient recovers. But it may be natural perspiration that takes place, still the noxious vapour is dispersed. As soon as it leaves the outer parts there is harmony. Even without medicine there may be spontaneous recovery.

The deep-seated noxious vapour does not withdraw by means of perspiration; it is owing to the depending breath, which by degrees diffuses itself; heat likewise quickly increases till it is fully restored. At noon there is moist heat of the body, accompanied with much despondency; there is also diminished respiration of the yang breath; then follows increased heat, and not rigor. According as the yang breath is stored up, the rigor is slight or severe, just as man's yang breath is abundant or diminished. Fever attacks him, or does not attack him, or the heat of the body increases by day and night, or declines on the morrow, just as the noxious vapour is slight or excessive.

Zymotic noxious vapour and ague do not differ much from each other: ague does not affect the centre receptacle, but zymotic vapour does; moreover, both commence with excessive rigor, and become subsequently attacked with heat, but it cannot be that rigosis can become fever, and be at the same time pernicious cold. With respect to the obscure noxious vapours' effects—the prescriptions for producing changes in disease—the symptoms either quietly dispersing outwardly, or easily descending inwardly. Easily dispersing makes harmony—easily descending inwardly, becomes refracting. Furthermore, the outward and inward, the preceding and the subsequent, do not coincide; there is the preceding external, the subsequent internal; there is the preceding internal, and the subsequent external; there is simply internal, without external; there is opposition on the part of the external and internal against each other; there is the external repeated again on external; there is the internal repeated again on internal.*

Dispersing outwardly may be recognised either by the formation of an eruption on the skin, or by critical perspiration, or by ordinary perspiration, or by dripping perspiration.

Withdrawing inwardly may be known by indigestion, hardness and swelling of the abdomen, or the constipation of the intestines, or the heat of the

* Simply nonsense. The Chinese mind delights in antithesis, and employs it on all subjects capable of demonstration; arguing in a circle is also a common failing of theirs.

body only allows a little to pass through the bowels, by tenesmus or by vomiting, or by retching or by wandering talk, by yellow lips,* or by a black tongue or a dry tongue. The foregoing are the symptoms, by reason of which symptoms the transmutations may be known, and by the transmutations it may be known how to treat disease.

The foregoing is a general statement. The careful inquiry into the pulse signs, and the laws of treating the sick by them, are discussed in a following section.

CHAPTER II.

First Indications of Zymosis.

Zymosis commencing to arise, there is first severe rigor, and afterwards feverishness, and on the following day there is heat, and no severe rigor. On the second and third day after its commencement the pulse is rapid, not weak and fluttering. To be more minute, at night there is feverishness, and towards evening an exacerbation, with headache and pains in the body. This is owing to the noxious vapour being in front of the spinal column and behind the abdominal viscera. Allowing that headache and pains in the body are owing to the noxious heat rapidly congesting the vessels, they cannot be recognised as the outward proofs of rigosis.

Forthwith administer mo. wong and kwai ki., with the intention of exciting perspiration.

When the noxious vapour is not in the vessels, perspiration injuriously affects the breath of the outward parts; the heat, moreover, does not subside, neither does it descend. When the noxious vapour is not in the inward parts, its descending injuriously affects the breath of the inward parts. The thirst being very excessive, recourse should be had to the surface permeating potion.†

The surface permeating potion:—Ping sang, 2 tseen‡; how po, 1 tseen; tsaou ku jeu, 5 fun; che mo., 1 tseen; cho yaon, 1 tseen; wong ching, 1 tseen; kom tsaou, 5 fun.§ To this add 2 chung‖ of water; boil it to one-eighth, and a little after noon drink it while warm.

Ping sang¶ should be divided into thin slices, and ground in a mortar. For removing noxious vapours it is a medicine having excellent properties; it moreover removes the pestilent vapours of Sing Nan (a mountainous district in Quang Si province, noted for its fatal malaria).

How po has the property of rending asunder the uncontrolable vapours which bind fast the internal parts.

Tsaou ku, its bitterness and pungency make it a powerful remedy. It removes deep-seated noxious vapours situated at the epigastrium.

The three are agreeable and harmonious in prescription. Their action on the interior is immediate, causing the noxious vapours to be separated and discomfited, quickly dispersing them by means of the true skin. It is thus they are "surface permeating."

Should the heat injuriously affect the saliva, add che mo, because it has the property of fertilizing the ying.

Should the heat injuriously affect the inner controlling breath, add pi cheuck, because it has the property of harmonising the blood.

Sho yaou purifies the remains of the scorched heat.

Kom tsaou** is a universal harmoniser. The latter four are agreeable, and cannot be harmonious remedies; but as regards dry, parched heat of skin, administer this potion; it is not proper to withdraw an ingredient.

* Sordes?

† Diaphoretic.

‡ Areca nut, or tseen, is about the same quantity as one drachm.

§ Liquorice.

‖ A chung is about a pint.

¶ Ping sang, or areca nut. I have used this medicine in the form of tincture, and gave it in the cold stage of intermittent, the patient generally ascribing immediate relief to it. I think it might be used instead of quinine with advantage.

** *Kom tsaou*, or liquorice, is an ingredient in almost every prescription of the Chinese doctor.

In general the zymotic noxious vapour wanders about in the vessels. When any particular vessel is affected, the particular remedy to be used is indicated; hence, restore health by acting accordingly.

In case of pain in the flanks, deafness, ague, vomiting, a bad taste in the mouth, it is the noxious heat overflowing the vessels of the parotid region. To the original prescription add chai hoo, 1 tseen.

In case of pain in the loins, over the shoulders, and at the nape of the neck, it is the noxious heat overflowing the vessels of the temples. To the original prescription add cheung hoo, 1 tseen.

In case of pain in the eye-balls and bones of the supercilliary arch and eye-lids, and stoppage of the nose and sleeplessness: this is owing to the noxious heat vapour overflowing the vessels of the top of the head. To the original prescription add kan ko, 1 tseen.

The symptoms not being alike, slow or quick, mild or urgent, the remedies should be apportioned, more or less, mild or active, and should be taken at the appointed time, in suitable quantities accordingly. Generally speaking there should be no difficulty in diagnosing the different vessels affected. When the tongue is white on its surface, and attenuation and heat not excessive, and the pulse is not frequent, showing that the interior is not affected, one or two doses are sufficient to disperse spontaneously.

The moderately severe sickness may be dispersed by perspiration. In cases where the perspiration is not able to disperse the illness, forsooth, it is the noxious vapour of the epigastrium in the dermis, which is a diaphragm interposed between the inside and the outside, the outer vapour cannot communicate with the inner, the inner vapour cannot permeate to the outer; there cannot be copious perspiration. Seeing this to be the case, add some dissipating medicine, with the intention of immediately producing perspiration.

It is an erroneous practice to put on clean clothes to remove the mess made by perspiration, or to use steam arising from a decoction heated on a lighted brazier. This is very erroneous.

The outward and inward heat not being able to inter-communicate is owing to the noxious vapour not overflowing or congesting the vessels of either of the three yang. It is unnecessary to employ the method of adding ingredients. It should be sufficient to conform to the original prescription.

When that which excites sickness is grave, the tongue is at first the colour of boiled rice throughout its whole surface. After drinking the decoction, the sickness is dispersed, not from perspiration, but from descending downwards.

The tongue is at first yellow, by degrees the centre is clear; by degrees the noxious vapour enters the inner receptacle. There are the indications for diminishing the potion, should the pulse be long overflowing and frequent; there may be great perspiration or much dry parching heat of the skin, according as the noxious vapour reaches to or recedes from the surface of the true skin, tending outwardly or inwardly. This is an indication for the use of the white tiger decoction.

When the tongue is of a clear yellow colour, in addition to the inward signs, it is because the noxious vapour has already entered the central recepticle; it is also the sign of the supporting breath.

On the second or third day the sickness is dispersed and scattered by means of the true skin. Of half a month 10 days have elapsed without any transmission. On the fourth or fifth day from the commencement, or still later by four or five days after, suddenly the heat regains strength.

Generally speaking, the primary breath prevailing, the injurious vapours are easily transmitted and transmuted. The primary breath being attenuated, the noxious vapour cannot easily be transmuted, and hence cannot be transmitted. This being the case, it happens that one's sickness becomes chronic, and, moreover, it happens that it becomes zymotic. It is possible to excite, but not possible to transmit sickness; how, then, can it be expected to transmit sickness? It does not transmit sickness, because the noxious vapour does not depart. The noxious vapour does not depart, because the disease is incurable, being protracted and involved in daily changes; recovery is suppressed; recovery withdraws. Many days elapsing, the patient cannot rise from his bed. The erring physician, admitting the dangerous nature of the

symptoms, immediately resorts to gin seng and chi, hoping to preserve some chance of recovery that the patient may not altogether die.

CHAPTER III.

The Determination of the Transmutations not Constant.

The noxious vapour which causes disease may be dispersed by critical perspiration, by spontaneous perspiration, by dripping perspiration, by perspiration with delirium; finally it may without perspiration determine to the interior of the system. The spontaneous perspiration may be dripping or soaking; on the other hand, the heat of the surface of the body may be exceedingly parched. A suitable diaphoretic dose disperses this.

The breath of the interior of the system may be offensive; therefore use purgatives; forsooth, the critical perspiration may also disperse this. It is, therefore, outward perspiration disperses it. Should the remains of the noxious vapour be internal, do not neglect this, for in three or five days the previous symptoms will again occur. Should there be jaundice, then use purgatives, and the patient will recover. Should there be purgation in a case of jaundice, and an eruption of the skin show itself, recovery may finally take place by means of the eruption of the skin.

Should the internal symptoms be urgent, supposing there is an eruption present, no recovery can take place without purgation. This is supposing that the determination of the transmutations of disease are not constant, and the transmutation of zymosis is constant.

There are the transmutations of the outward appearances of disease. A man is suddenly seized with excessive appetite, supposing that previously he has been empty, and weak from illness, the noxious vapour taking advantage of his emptiness, suddenly seizes on the lower abdomen, the breath of the passage downwards becomes impeded. It now happens that he cannot micturate, the lower abdomen becomes distended, every evening there is an exacerbation of fever, therefore indicating what line to pursue; five ling and five pi tso lin (a lesser quantity will not do); this is one dose of this greath strength-restoring remedy; urine flows out, and there is recovery.

Perhaps the sickness is external—the moderated noxious vapour attacks one particular place, taking advantage of the night time, which is injurious, the determination occurs, as hæmorrhage from the womb, the sudden appearance and cessation of the menses, pain in the heart, uneasiness in the testes, the phlegm of urgent asthma; generally speaking, all the above occur without regular transmutations.

In general the noxious vapour moves like water; it flows and is impeded in a similar manner. The determination of the transmutations not being constant, mankind is benefited thereby; but then an epidemic complaint may be rendered chronic disease. Is it a sound theory that each particular part of the body has a particular illness belonging to it, and that this epidemic disease is to be treated, and that chronic diseases are to be allowed to get well of themselves?

APPENDIX No. LVII.

ON THE PROPER CARRIAGE OF STRETCHERS AND OTHER CONVEYANCES OF THIS CLASS.

By Deputy Inspector-General LONGMORE, C.B., Professor of Military Surgery Netley.

"On a besoin d'une certaine habitude pour remuer un blessé, pour le charger sur un brancard, et pour le transporter; c'est moins par la force que par l'adresse qu'on y réussit, et celle-ci ne s'acquiert que par l'exercice."*

A FEW remarks upon the manner of placing wounded men upon hand-conveyances, and a few rules as to the proper plan for the bearers to carry them, are necessary to be pointed out, and to be enforced in practice, in order that the patients may be transported with as little risk of aggravating their injuries as is compatible with their removal, and with as much ease as each kind of conveyance included in this class is capable of affording. These rules require to be attended to more especially in carrying stretchers, but most of them are applicable also to those conveyances which are carried by suspension from the shoulder. The rules to be followed are themselves simple, and appear particularly so from description; but, as observation shows, they are constantly ignored in practice, and those who are carried suffer proportionally.

The main purposes to be kept in view in carrying these conveyances are, firstly, that as little as possible of the impulse connected with the progression of the bearers shall be communicated to the litter which they are bearing; and secondly, that the conveyance may be kept level, and as near the ground as is consistent with free carriage and the absence of risk of contact. If one of these conveyances be badly carried, it may be shaken in such a way by the movements of the bearers as they step along, that if it be a stretcher on which the patient be lying, he may be rolled upon it from one side to the other alternately; or, if it be a dhooley or hammock, he may be subjected to a lateral swinging movement, nearly as unpleasant and fatiguing as the rolling just described. Again, the machine may have such a motion communicated to it that the patient may be jerked *upwards* with every step, and this motion may be in addition to the swinging or lateral rolling before named; or the patient may be so placed that his head is lower than his feet, or his body may be unevenly supported, in either of which cases the ill results of the movements just described will be felt with more severity. The conveyance again may be raised so high that the patient upon it may be kept in constant apprehension of falling off; or, in case of one of the bearers accidentally stumbling and allowing the conveyance to fall, he may receive such additional injuries as to lead to serious consequences. All these objectionable movements and wrong positions, which would be irksome enough to men in sound health, entail serious suffering and risks to men who are worn by illness, or who are labouring under fractures of bones or other severe wounds. Fortunately this suffering may be in a great degree prevented, by a systematic observance of the rules hereafter mentioned, whatever the circumstances of the locality, or whatever differences there may be as to height or strength among the bearers.

One of the first things to impress upon bearers is that every movement of a man who is just wounded must be made with considerate care and gentleness, to prevent pain and aggravation of his injuries. Care when raising him from the

* Histoire de Percy. Versailles, 1827, p. 380.

ground, where he has fallen; when placing him upon the stretcher; when lifting the stretcher with the patient upon it; when halting and laying it down for the purpose of resting; in each of these cases care is as essentially necesssary to obviate suffering and additional mischief, as is a properly regulated step during the transport itself. "If the stretcher carriers throw a wounded man hastily upon the stretcher, in place of depositing him upon it with gentleness," writes Baron Percy, "what shocks! what tearing pains will not the unfortunate patient suffer!"*

Very particular care is required when the patient has had a bone recently shattered by gunshot. The proper manner of accomplishing the delicate task of lifting and removing a man with such an injury, the various modes of protecting the broken limb during the transport, are subjects in which all bearers of wounded require to be specially instructed.

But it is not only in *recent* wounds that a disciplined system of proceeding is necessary for bearers; it is equally requisite, if not more so, for those which have passed the recent state. Great as the torture is of wounded men, when they are carried badly shortly after their wounds have been received, the torture is greatly aggravated under the same circumstances after inflammatory action has set in. Nature then increases her demands for rest and quiet in order that the processes of repair may go on, and by every means in her power makes the demand known. Interfere with her under these circumstances, and she resents the interference not simply by the infliction of pain, but, if the interference be great, by pain that is past expression, and, if sufficiently prolonged, by pain that is past endurance, for the sufferer will succumb under its overpowering influence.

Sir Charles Bell tried to describe the effects of rough transportation on some of the wounded Frenchmen who were brought into Brussels nearly a fortnight after their wounds had been received at Waterloo. "I saw," he writes, "the soldiers who, in the morning, were moved by the piteous cries of those they carried, in the evening hardened by the repetition of the scene and by fatigue, and indifferent to the suffering they occasioned. It was now the 13th day after the battle. It is impossible for the imagination to conceive the sufferings of men, rudely carried at such a period of their wounds. When I first entered this hospital, these Frenchmen had been roused and excited in an extraordinary degree, and in the glance of their eyes there was a character of fierceness which I never thought to have witnessed in the human countenance. They were past the utterance of what, if I might read the countenance, was unsubdued hatred and desire of revenge. On the second day, the temporary excitement had subsided," &c.†

As stretchers alone are the authorised conveyances *borne by men* in the British Service, the rules for the guidance of bearers during transport are given with a view mainly to the proper carriage of these conveyances.

It is usual in the British Service to tell off only two men to every stretcher. For several reasons, however, it is most desirable that three men should accompany every stretcher which is to be used for carrying wounded from the field of action. The third bearer is required in case of either of the other two bearers becoming wounded, to act as a relief to the bearers during the transport, and to assist in placing upon the stretcher men who have been rendered quite helpless by their wounds, especially those who have met with serious fractures of bones from gunshot. For these latter cases the presence of a third bearer is of essential importance. A patient with a fractured thigh or leg should never be lifted up and put on a stretcher by two bearers only, unless under extreme urgency. The position of patients after they are on the stretcher, too, both on starting and during transport, frequently requires rectification, owing to displacement from bellying of the canvas, or to the effects of movement during the carriage; and this can only be done, without laying the stretcher down on the ground, when a third bearer is present.

Before attempting to remove a badly wounded man from the spot where he has fallen, the stretcher should be brought close up to him; the wounded man should not be carried by hand farther than can be avoided. In placing the stretcher for this purpose, it *should not be laid by the side of the patient*, but

* Op. Cit., p. 380. † Surgical Observations, part 3, p. 323.

at his head, and should not be placed crosswise, but the length of the stretcher should be in the same direction as that in which the wounded man happens to be lying. If placed by his side it interferes with the movements of the bearers in lifting him up, necessitates their moving to the end of the stretcher, or stepping across it, and is liable to cause them to stumble when they are depositing the patient upon it. If placed crosswise at the patient's feet, it leads to the necessity of the bearers turning round, and again causes the risk of one or other of them falling over the side poles. These objections are avoided by the stretcher being placed longitudinally; the patient is readily carried head forward over the canvas on which he is to lie, and the bearers move with a clear view of the stretcher before and between them, until the patient's head is directly over the pillow on which it is to rest.

The bearers told-off for carrying a stretcher must be severally distinguished by some ready appellation, and one must take the direction of all the duties connected with the transportation of a patient. The bearer who marches foremost is usually designated the front, or No. 1, bearer; the one who is behind, the rear, or No. 2, bearer. If a third bearer is told off to assist in the transport, he is designated No. 3 bearer. The rear, or No. 2, bearer must assume the direction; for his position enables him to see not only the patient on the stretcher, but the front bearer also, while the front bearer cannot see either, but only the ground or other objects before him. There are certain parts of the transport which should always be conducted by short words of command; these are especially the lifting up and placing a wounded man on the stretcher; the start; and the laying down the stretcher. The object is not so much to ensure the alert and sharp movement which is required in military exercises, as it is to ensure, without loss of time, the necessary caution, steadiness, and well-concerted action of the bearers.

Lifting up and Placing a Wounded Man on the Stretcher.

As soon as all essential preliminary attention to the general condition of the patient, or to the particular injury he has received, the necessary prevention of movement of a limb, if a bone be broken, by any available support at hand, the preparation of stays or supports on the stretcher itself, if needed for the injured part, by arranging the man's clothing or accoutrements for the purpose, and all other such matters, which, it is presumed, the sick bearers are familiar with, have been attended to, the next proceeding is to place the patient on the stretcher.

With three bearers, this is best done by two of the bearers stooping down on opposite sides of the patient, near his haunch-bones, the two bearers facing each other. The third bearer places himself in a stooping position near the wounded part of the patient, ready to give to it his undivided attention. The two bearers facing each other gradually get, each one hand, under the back of the patient, their other hands being passed and mutually grasped under the upper part of his thighs, as close to his breech as possible, and the third bearer at the same time taking charge of the injured limb, or other part, itself. As soon as this is done, the bearer who takes the direction gives the word "ready." At this word the bearers secure a firm grasp of the patient. The order "lift up" follows. Immediately, all the bearers, acting together, slowly rise from the stooping posture, and, bringing their knees together, stand up. As soon as the erect position is gained, the order is given to "march." The bearers march until the patient is exactly over his place in the litter, and the order "down" being then given, he is carefully lowered, each bearer at the same time dropping slowly down into the stooping position, and is deposited upon it.

The Start.

The start in every instance will be best accomplished by dividing the action into four parts, and assigning to each its distinct word of command. As soon as the patient is properly settled upon the stretcher which is lying upon the ground, No. 2 bearer gives the word "fall in." At this command No. 1 and 2 bearers get into their proper positions at the head and foot of the stretcher, and No. 3 by the side of it. As soon as this is done, No. 2 bearer gives the word

"ready." The two bearers at once adjust the ends of the shoulder-straps and take hold of the handles of the stretcher-poles. This being done, No. 2 bearer gives the word "lift," and immediately the two bearers raise the stretcher steadily together. No sooner is the stretcher raised, and all is seen to be right, than the word "march" is given by No. 2 bearer, and both bearers at once move off.

Laying down a Stretcher with a Patient upon it.

In like manner, when the stretcher is to be lowered and placed on the ground, it will be best done by corresponding divisions of the action and words of command. No. 2 bearer calls "halt," at which both bearers stop, but without any abrupt or sudden jerk; the word "ready" is then given, which is the signal for getting into position to stoop; the word "down" follows, when the stretcher is lowered, and laid gently on the ground; and lastly, at the word "fall out" the two bearers quit their hold of the handles and move away from the stretcher.

A systematic performance of these duties in the manner described is easily acquired, and when the bearers are trained to it, is calculated to prevent many a mishap, and to lessen the pain to wounded or sick men on all occasions. Every bearer should be trained to take the duty of a No. 1, 2, or 3, bearer at any moment his services may be required in either capacity.

Some general rules on the carriage of stretchers now follow.

General Rules for carrying Stretchers.

Rule 1.—The front and rear bearers of the conveyance must start with opposite feet. They must not move "in step," but, on the contrary, must march out of step, or, as the ordinary expression is, must "break step." If the man in front step off left foot forward, the man in the rear must step off at the same moment right foot forward, or *vice versâ*, and this broken step must be maintained throughout the whole distance of the transport.

It is not an easy matter at first to enforce this rule among men who have been serving in the ranks of the army; indeed, it is only by systematic instruction and practice that the proper method of carrying a stretcher can be acquired by them, and it therefore becomes one of the first lessons in the instruction of men whose duty it is to carry sick and wounded.

Marching in step is rendered natural to drilled soldiers by the force of habit and the importance which really attaches to the accurate preservation of the proper cadence and correspondence of step in the combined movements of military exercises they are apt to attach to it under all circumstances. There is preserved a conversation between Sir John Moore and the soldiers who were carrying him in a blanket from the field of action after he had received his fatal wound, which well illustrates how deeply a belief that the comfort and repose of wounded men under such circumstances depends in a great degree upon the bearers *keeping step* is impressed on the minds of soldiers of all ranks. The anecdote is related by Sir John Moore's brother. "A spring wagon bearing Colonel Wynch wounded from the battle came up. The Colonel asked, "Who is in the blanket?" and, being told it was Sir John Moore, he wished him to be placed in the wagon. The General asked one of the Highlanders whether he thought the wagon or the blanket best, who answered that the blanket would not shake him so much, as he and the other soldier would keep the step, and carry him easy. Sir John said, "I think so too"; so they proceeded with him to his lodgings in Corunna, the soldiers shedding tears as they went."* Neither the patient nor his bearers had the least idea that keeping step so carefully was really serving to defeat the very object they all had in view.

The reason which dictates the rule I have named is readily apparent on examination. If two men carrying a stretcher between them keep step in starting as a front and rear rank soldier do in commencing to march, that is, if both men advance their right feet together there must at the same time be a downward inclination of the body of each man towards the same side in proportion to the distance to which his foot is advanced, and equally so of the

* Moore's Campaign in Spain, by James Moore, Esq. London, 1809. Fourth edition, p. 362.

stretcher which they are carrying. When next the left feet are advanced together, the inclination will be changed from the right to the left side, and the alternate change of inclination will be unavoidably communicated to the wounded man lying upon the canvas stretcher, and will be continued so long as the step is kept. The wounded man is placed in much the same circumstances as regards this kind of movement as a man who is riding on a camel, instead of being, as he should be, in the position of one on the back of a horse when the animal is walking. But when the step is broken at starting, that is, when the front rank man advances his right foot, and at the same time the rear man advances his left foot as the horse does his opposite feet, the dipping motion down to either side is avoided, and the surface of the stretcher is maintained on a horizontal plane. With each step of the bearers there is a moderate upward and downward movement of the stretcher, chiefly owing to the pace and the elasticity of the side poles, but, with this exception, the general level is preserved. There is no lateral movement giving the patient a tendency to roll from side to side.

The rule equally applies if the stretcher be carried by four instead of by two men. The step must be broken by the front and rear rank men so that the level of the stretcher may still be preserved.

Rule 2.—The bearers must march with a steady but easy step, particularly avoiding elevation of the bodies by springing from the fore part of the feet. The foot should be planted without any wavering on the ground at each step, and in moving forward it should only be raised sufficiently to clear the ordinary impediments on its surface. Some bearers, unless this rule is enforced, will make a slight spring in their movements, which spring is of course communicated to the more or less pliable conveyance they are carrying. They do so on the belief that the weight is sustained more easily in consequence of the elastic movements which is thus obtained, but they take no note of its ill effect on the person conveyed.

The Length and kind of Step best suited for Bearers.—In carrying a stretcher the pace should not be so long as it is in marching in the ranks, and the movement of the lower limbs should be conducted on different principles. When a combatant recruit is under instruction he is taught, in practising the balance step, which forms the foundation on which the art of marching is built up, that the knee should be kept stiff, and the whole limb straight, when it is either advanced in front or extended behind. The movements of his lower extremities are all to be from his hips.* The toe of his foot is to be advanced, and foot brought to the ground at 30 inches distance, measured by the pace-stick, from heel to heel. This is the slow step; in stepping out the pace is lengthened to 33 inches. In the ranks, not only is length of stride and consequent speed of movement gained by this proceeding, but it enables an uniform pace to be preserved with bodies of troops. At the same time, the length of the marching stride and the movement from the hips unavoidably induce an upward and downward movement of the parts of the soldier's body above the hips. The trunk sinks as the foot is advanced; it is raised as the limb is again brought vertically under it. This alternate elevation and depression is sufficiently manifest to anyone who observes a line of troops advancing towards him, or, more conspicuously still, if they are moving on the other side of a hedge, with only the upper parts of their bodies exposed. The kind and length of pace just described will not answer so far as stretchers are concerned, if they are to be carried to the best advantage. The gait of the hawker who habitually carries a basket of crockery, or of a man carrying a bucket of water, on his head, is the most suited to the circumstances of a patient carried on a stretcher; for with such a gait the trunks and arms of the bearers, and, consequently, that which they are carrying, are least lifted up or moved. The peculiarity of this gait is, that in it the hip-joints are used as little as possible, the advance is made with the knees kept bent, and the step is shorter. The knees are never wholly straightened, as in marching. The length of the pace is about 20

* The movement of the leg must spring from the "haunch". Both knees must be kept straight, except while the leg is being carried from the rear to the front, when the knee must necessarily be a little bent, to enable the foot to clear the ground without grazing it.—See "Position in Marching," "Field Exercise, 1867."

inches. This is the kind of gait which is assumed by the native dhooley-bearers in India when they are carrying sick, and is the most effective for stretcher-bearers too, when trying to prevent undue movement of the stretcher.

The difference in the rise and fall of the upper part of the body between a pace of 30 inches and a pace of 20 inches, is greater than might be suspected. When two men holding a stretcher without a man upon it make together a pace of 30 inches, measured from heel to heel, the dip of the stretcher is 3½ inches; with a man upon it, the arms being then stretched to the full by the weight, the dip is 4½ inches. When the pace is 20 inches, the dip, without a man upon the stretcher, is only 1½ inches; with a man, 2½, or about one-half of the dip in the longer pace. Of course, in marching at either pace there is an alternate rise and fall to the same extent, and the effect of this on the elastic poles of a stretcher can readily be imagined. The extent of elevation and depression which has just been mentioned is irrespective of jerking or any other movement, having been carefully measured when the bearers were standing still at each position.

There is another difficulty in applying the ordinary marching step to men engaged in carrying stretchers. The position of the traverse causes it with a pace of 30 inches, to press very severely, especially an iron traverse, upon the front and upper part of the advanced thigh of the rear, or No. 2, bearer. The traverse also touches the back of the rear thigh of the front, or No. 1, bearer; but, as the motion of this limb is away from the stretcher, it does not cause any marked inconvenience. The result is, that in trying to march with a pace of 30 inches, the rear bearer is subjected to a sharp blow from the traverse on one or other of his thighs, at every step. A jolt is also, at each contact, communicated to the stretcher and patient upon it. With a pace of 20 inches, the traverse being placed as it is in the regulation stretcher of the British Service, at a distance of 7 inches from the end of the handles, the thigh of the rear bearer is just cleared, and no impediment in this respect is given to the forward motion.

For *perfect* carriage of a stretcher, the feet of the two bearers who are marching with it should not be brought to the ground at the same instant of time. A certain interval—about half the time occupied in the whole stride—should elapse after the No. 1 bearer has planted his foot on the ground before the No. 2 bearer plants his foot on the ground. Supposing every step to occupy half a second of time, then, with this arrangement, each of the fore feet of the two bearers would be successively planted on the ground at intervals of one-fourth of a second of time. The right foot of No. 2 bearer would step on the ground a quarter of a second after the left foot of the No. 1 bearer had been planted on it; the right of No. 1 bearer a quarter of a second after the right of No. 2 bearer; the left of No. 2, the same time after the right of No. 1; and so on. The walking pace of a horse would be imitated by the adoption of this method of movement, though not exactly as regards the relative duration in time of each separate part of it.

If a horse be observed when walking slowly, it will be seen that no two feet of the animal are placed upon the ground at one and the same time. Two limbs are always in movement together, but the movement is not arrested at the same moment; the pace is, in short, broken throughout. The easy motion of a horse, as regards riding, is, no doubt, due in a great measure to this fact. But though additional ease would be equally gained by applying the same system of movement to the four feet of the bearers who are supporting a stretcher, it is found most difficult in practice to attain it. It is comparatively an easy matter to teach bearers to carry a stretcher *out of step*, that is, to move with opposite feet; but it is almost impracticable to teach men who have been drilled in the ranks to carry a stretcher *out of time*. It is well to be aware that there would be less unevenness of movement of the stretcher if the bearers did not step in even measure of time; but considering the great impediments to stepping otherwise, especially among men whose duty it is but very rarely to act as stretcher-carriers, it seems hardly wise to try to insist upon uneven time being one of the rules for carrying stretchers.

Rule 3.—Whether even or uneven as regards measure of time, great care must be taken that the steps of the front and rear bearers are invariably *even*

and alike in distance. If the steps do not well and accurately agree in length, there will constantly be a hasty "catching up" of one or other of the bearers; and the stretcher and patient will be jolted on every occasion when an effort is thus made to re-adjust the distance. If the bearers march with an exactly corresponding step as regards length, this source of disturbance will be avoided.

Rule 4.—When distributing bearers, as far as circumstances permit, men nearly of the same height and strength should be selected for acting together. When a stretcher is supported by men of equal height and proportion, if the ground be level, the stretcher will necessarily assume a horizontal position also, and men possessed of like degrees of strength will carry the weight and move together more evenly. If the ground be uneven, the bearers will have to mutually adapt the height of their respective ends of the conveyance to the irregularities, in order to preserve its level condition.

Rule 5.—When braces or shoulder-straps are used to assist the bearers in carrying stretchers, care should be taken at starting that they are buckled so that the parts supporting the poles are all at equal distances from the *surface of the ground.*

Rule 6.—As most ground over which wounded have to be carried is likely to present irregularities of surface, it becomes an important matter for bearers to practice the carriage of stretchers, so as to acquire a facility of keeping the stretcher level, notwithstanding the ground is uneven. Bearers trained and habituated to this duty perform it with ease and dexterity, irrespective of differences in their own respective heights; while those who have not practised it are not unlikely to cause considerable distress to the person carried, when they have to carry him up and down hill, in consequence of their deficient training. A concerted action of the front and rear bearers is necessary, and each must be aware what part he is to perform, according as the end of the stretcher at which he is placed is rendered higher or lower by the unevenness of the surface over which they are passing. The act can readily be acquired by practising the carriage of the litter up and down steps. In this practice the front and rear bearers should occasionally change their respective positions. A bearer should also be carried on the litter in turn, so as to be made practically aware of the effects of even and uneven carriage.

Rule 7.—If the ground over which the conveyance has to pass presents a general ascent, and the bearers are of different heights, then the rear or No. 2 bearer should be the taller and stronger man; for his greater height, and the greater strength of his arm, will be useful in supporting and raising the stretcher up to the level of the end carried by the foremost man. The weight of the stretcher will naturally be thrown in the direction of the man on the lower level.

Rule 8.—If the ground presents a general descent, the front or No. 1 bearer should be the taller and stronger, for the same reasons as those just given as regards the No. 2 bearer, under the opposite circumstances mentioned in Rule 7.

Rule 9.—A sick or wounded person on a stretcher should be carried, if the ground be tolerably level, with his face looking toward the direction in which the bearers walk. The front, or No. 1, bearer then supports the end of the stretcher at which the patient's feet are placed; the bearer near the patient's head is the rear bearer.

Rule 10.—If the bearers have to carry the stretcher up hill, the front bearer should support the end of the stretcher on which the patient's head is placed, excepting in the case mentioned under Rule 11.

Rule 11.—If the bearers have to carry the stretcher down hill, the rear, or No. 2, bearer should support the end on which the patient's head is placed. The reverse position should be assumed by the bearers, both as regards going up hill and going down hill, in case the patient being carried is suffering from a fracture of the thigh or leg.

It seems obvious that the patient's comfort and welfare will be best consulted, as a general principle, by the arrangements named in Rules 10 and 11. With regard to the exception named, a reverse position of the patient is given to revent the weight of his body pushing the upper end of the broken bone down upon the helpless and motionless portion of the limb below the seat of fracture. Although under all circumstances the level position should be sought

for as much as possible, still if the slope of the ground be such that it cannot be attained, it appears desirable that the inclination downwards should be towards the feet rather than towards the head of the patient; yet an opposite injunction is given, without any exception, in the manual of instruction for the French Infirmiers. It is there laid down that, in ascending a hill, the feet of the patient should be placed in front; in descending, the patient's head should be in front.* I do not know the principle on which this rule has been laid down.

Rule 12.—Never attempt to carry a helpless patient over a high fence or wall, if it can possibly be avoided; it is always a dangerous proceeding. The danger is of course increased in proportion to the height of the wall or fence; but even if the wall be not much higher than one over which the bearers can step, the stretcher must be made to rest upon it to the inconvenience and probable pain of the patient, while each bearer in succession gets over the obstruction; and it is better to avoid even this inconvenience, provided the avoidance does not entail great delay. If the fence or wall be high, either a portion of the wall should be thrown down, a breach in the fence made, so that the patient may be carried through on the stretcher, or, if this be not readily practicable, the patient should be carried to a place where a gate or opening does already exist, notwithstanding the distance to be traversed may be increased by the proceeding. It is better that the transportation should be somewhat delayed than the safety of the patient's limbs or life risked.

Rule 13.—In crossing a ditch, dyke, or hollow, the stretcher should be first laid on the ground near its edge. The first bearer then descends. The stretcher, with the patient upon it, is afterwards advanced, the first bearer in the ditch supporting the front of the stretcher while its other end rests on the edge of the ground above. While thus supported the second bearer descends. The two bearers now lift the stretcher to the opposite side, and the fore-part being now made to rest on the edge of the ground, while the rear part is supported by the second bearer in the ditch, the first bearer is left free to climb up. The stretcher is now pushed or lifted forward on the ground above, and rests there, while the second bearer climbs up. The two bearers then carry the stretcher on.

Rule 14.—On no account should a stretcher be permitted to be carried on the shoulders of two or four bearers. The evil of such a proceeding is not only that it is difficult to find several bearers of precisely the same height, so that a level position may be secured, but also that the wounded or sick person, if he should happen to fall from such a height, owing to the helpless condition in which such a patient usually is, is not unlikely to sustain a serious aggravation of the injuries he may already be suffering from. General Stonewall Jackson, of the Confederate States' Army, is said to have apparently owed his death to neglect of this rule. He was being removed, wounded, from the field of action, on a stretcher, by four bearers. The stretcher was carried on their shoulders. One of the bearers, while engaged in this duty, was shot, and fell, and the General was immediately thrown off the stretcher. The suddenness of the event, and the height from which he fell, caused General Jackson to come into contact with the ground with such force that not only the character of his wound, which was by no means a mortal one, was aggravated by the blow, but he received also a severe concussion of the chest, which was followed by inflammation, and appeared to be the immediate cause of the fatal termination which ensued. Moreover, one of the bearers of a stretcher ought always to have his patient in view, so as to be aware of hæmorrhage, fainting, or other change requiring attention, taking place, and this cannot be done when the patient is carried on the shoulders. The height, too, is calculated to cause the patient uneasiness and fear of falling off, which it is also desirable to avoid. For all these reasons, notwithstanding that bearers will often attempt to carry a patient in a stretcher upon their shoulders, from the weight being borne more easily in that position, or with a view of relieving a fatigued condition of the arms, the practice should be strictly forbidden.

* "Quand les porteurs de brancards gravissent un place fortement incliné, les pieds du blessé doivent etré placés en avant; quand ils descendent, au contraire, c'est la tête qui doit passer la première".—Ministère de la Guerre, 5e direction. Manuél de l'infirmier de visite. Paris, 1867.

Rule 15.—If the wounded man lying upon a stretcher have to be transferred into an ambulance wagon, a third bearer should always be employed to assist in the proceeding. This is provided for if three bearers accompany the stretcher, as contemplated in some of the foregoing instructions. On the arrival of the stretcher at the wagon, the bearer at the end which is first to be inserted should be ready to move round the end of the pole in his left hand, retaining, while he does so, the support of this pole only. Before he makes this move, however, the No. 3 bearer must grasp the right-hand pole; the hold of it should on no account be given up by the first bearer until he has quite ascertained that the pole is fully supported by the No. 3 bearer. When this is known to be accomplished, the first bearer turns round, supporting the left pole at the side as he does so, and then, acting in concert with the No. 3 bearer, these two bearers together raise the ends of the poles, which are now free, into the compartment of the wagon which is destined to receive them. The bearer at the head of the stretcher at the same time takes care to maintain it level, and assists in effecting its entrance into the wagon by pushing it forward. With this system the admission of the stretcher is effected with ease, rapidity, and perfect security, while two bearers can only accomplish the object with difficulty, and not without risk of accident to the patient.

Although the instructions and rules above given occupy rather a considerable space in description, they have been found to be acquired and practised without difficulty by men who have been properly instructed in them. Indeed, trained orderlies of the Army Hospital Corps carry them out naturally, as it were, and perform their duty as bearers of sick and wounded, with more speed and satisfaction than it could possibly be done without a fixed system of proceeding, and the intelligent action which results from it.

APPENDIX No. LVIII.

ARMY MEDICAL SCHOOL, NETLEY.

The attendance of Medical Candidates for Her Majesty's British Service during the last two Sessions was as follows:—

The 15th Session, or Winter Session, of 1867-8, was attended by 44 candidates; the 16th, or Summer Session, of 1868, by 39, of whom one retired from ill health.

During the same Sessions there were 12 and 20 candidates for Her Majesty's Indian Service.

There were also two candidates in each Session for service on the West Coast of Africa.

The order of precedence in which the candidates for the two services were eventually arranged to be gazetted was fixed according to the combined results of the two examinations, and is shown in the lists which follow.

The questions put at both examinations, at Chelsea and Netley, are also given.

FIFTEENTH SESSION.—WINTER 1867-8.

COMBINED RESULTS of the Chelsea Examination in August 1867, and of the Netley Examination in February 1868.

NAMES of Candidates for the British Medical Service, arranged in Order of Merit, with the Total Number of Marks.

Order of Merit as finally settled.	Names arranged in Order of Merit for both Examinations.	Total Number of Marks. (Maximum, 6,900.)	Order of Merit as finally settled.	Names arranged in Order of Merit for both Examinations	Total Number of Marks. (Maximum, 6,900.)
1	Corbett, R. de la C.	5,197	23	Hunter, J. H.....	3,321
2	Wollowicz, C. de .	4,966	24	Wilson, W. O.....	3,294
3	Corbett, J. L....	4,930	25	Cotter, S. K.	3,278
4	Maclachlan, H. K.	4,904	26	Barroll, G. W. ..	3,251
5	Scott, R. T.....	4,486	27	Barry, J.....	3,250
6	Pollock, C. F.....	4,696	28	Bennett, W. F. ..	3,226
7	Cocksedge, T. A. J.	4,471	29	Anderson, J. A...	3,211
8	McEwen, D.	4,460	30	Riddick, J.....	3,172
9	MacMullen, R. ..	4,351	31	Anderson, D. H B.	3,131
10	Sankey, G. F.....	4,314	32	Waylen, J. H.....	3,025
11	Randall, J. G.....	4,214	33	Morgan, H.....	2,969
12	Cuthbertson, R. A.	4,212	34	Crowe, J. D.	2,850
13	Macnamara, W. H.	4,132	35	Anderson, A.	2,790
14	Gallwey, M. M. ..	4,125	36	Fitzgerald, E.....	2,785
15	Lyons, F.....	4,074	37	Kingston, T.	2,758
16	Hare, G.....	4,020	38	Popham, G. L. ..	2,706
17	Steward, F. G. ...	3,610	39	Shaw, G.....	2,678
18	Gunning, J. D. ..	3,543	40	Heather, D. C. W.	2,665
19	Clarke, T. H. M. .	3,490	41	O'Grady, J. J.....	2,477
20	Anthony, Mark ..	3,435	42	Morgan, R.....	2,415
21	Leake, J. R.	3,372	43	Mannsell, R. F...	2,379
22	Rae, G. A.	3,360	44	Jagoe, H.	2,732

NAMES of Candidates for the Indian Medical Service, arranged in the Order of Merit, with the Total Number of Marks.

Order of Merit.	Names arranged in Order of Merit for both Examinations.	Total Number of Marks. (Maximum, 6,900.)	Order of Merit.	Names arranged in Order of Merit for both Examinations.	Total Number Marks. (Maximum, 6,900.)
1	Lethbridge, A. S..	5,451	7	Davidson, J.	4,388
2	Stephen, A.....	5,386	8	Jayaker, A. S. ..	4,291
3	Ratton, J. J.	5,305	9	Keith, J. F.	3,972
4	Newmann, J. H...	4,984	10	Trinnell, E. A. ..	3,829
5	Johnstone, H,....	4,767	11	Harvey, C. A.....	3,543
6	Gordon, W. R. ..	4,436	12	Hanks, W.	3,339
	For Service on the West Coast of Africa.				
1	Duncan, G.....	2,307	2	Buscarlet, T. A...	2,365

CHELSEA EXAMINATION, AUGUST 1867.

ANATOMY AND PHYSIOLOGY.

1. Describe the origin, course, distribution, connexions, and function of the spinal accessory nerve and its branches.

2. Describe the arch of the aorta, and its relations; mention the vessels arising from it; and enumerate the more usual deviations from the normal disposition, to which they are subject in their origin.

3. Give the structure and relations of the membranous portion of the urethra.

4. Describe the minute structure of the walls of the larger and smaller arteries, veins, lymphatic vessels, and capillaries.

5. Point out the distinctions between the male and female adult osseous pelvis, and give the average dimensions of each outlet in the two sexes.

6. Enumerate the transparent parts of the eye; describe the form, structure, and relations of each, and the mode in which the visual image is formed on the retina.

7. Mention the conditions under which the amount of carbonic acid given off from the lungs is *increased* or *diminished*.

SURGERY.

1. Describe the symptoms of a case of ruptured kidney, the treatment to be pursued, and the results that may ensue upon such an injury.

2. What are the usual forms of hernia in children, male and female? Describe the difference between a congenital and infantile hernia.

3. Describe the treatment to be persued in a case of punctured wound with copious arterial hæmorrhage in the palm of the hand.

4. Describe the symptoms of popliteal aneurism, and the treatment to be pursued.

5. Describe the symptoms of a case of pyæmia after amputation of a limb, and the pathological conditions found after death; and the external circumstances under which it is most likely to occur.

MEDICINE.

1. Enumerate the diseases giving rise to coma, and name the chief symptoms, in addition to the coma, which would be present in each case.

2. What are the chief structural lesions which may occur in the nervous tissue of the brain and chord, and what symptoms may they produce?

3. How would you diagnose and treat a case of great hypertrophy of the left ventricle of the heart, and what would have been the most likely causes of such a condition

4. A person comes to you complaining of very severe pain in the right side, which has come on suddenly, and is attended with considerable Dyspnœa. What might be the causes of such a condition, and how would you examine the patient with a view to determine the cause?

5. What are the preparations of iodine and of bromine in the British Pharmacopœia? What are their doses; how are they presumed to act; and in what diseases are they most commonly employed?

6. Trace the successive events in the case of a normal delivery at full time. What would you do in the case of flooding after delivery, before the placenta has come away, and afterwards?

Natural History, &c.

i. Zoology.

1. What are the principal distinctive characters of the five classes of vertebrate animals?

2. Describe the principal modifications of the nervous system in invertebrate animals.

3. What are the chief modifications of the mouth of insects?

4. Give a sketch of the geographical distribution of mammals.

ii. Botany.

5. Explain the structure, development, and principal modifications of the vegetable ovule.

6. Give the essential characters of the natural order compositæ.

7. What are the principal kinds of vernation and æstivation in plants? Give examples of each.

8. Define exosmose and endosmose; and explain the circulation of fluids in plants.

9. What are the principal characteristics of the Australian Flora?

iii. Physics, &c.

10. What is the composition of the atmosphere, and what its physical characters?

11. Explain the construction of the common pump. Why is there a limit to the height to which it will raise water?

12. Describe the structure of the compound achromatic microscope.

13. What is a glacier? How is it formed? and how does it move?

14. What are the grand divisions of the rocks composing the crust of the Earth, and the principal types of fossils characteristic of each.

NETLEY EXAMINATION, FEBRUARY 1867-8.

Held at the close of the 15th Session of the Army Medical School from 3rd to 8th February, 1868.

A. Written Examination.

I.—Hygiene.

1. Give a general sketch of the construction of barracks in the United Kingdom as now fixed by regulation, and state how the ventilation is provided for. What quantity of water is allowed per head, and what are the chief points to which you would attend in ascertaining, and in maintaining the purity of the supply?

2. What are the meteorological instruments used in the Army Medical Department? What are the thermometrical observations of most importance, and how is the dew point learnt from the readings of the dry and wet bulb?

3. Give a short sketch of the chief conditions at Gibraltar which might affect the health of the troops.

4. What were the numbers of admissions and the rate of mortality per 1,000 in the Presidency of Bengal in the early part of this century? What are the rates now? Give briefly an account of the chief causes of the change Explain *shortly* the causes which affect the ratio of deaths to *admissions* in tropical climates.

II.—Pathology.

1. Give the necessary details for determining the *external* measurements of the heart, as you have seen them measured in the *post-mortem* room. State the average measurements of a normal sized heart between the ages of 20 and 40; and give some account of the direct and indirect consecutive diseases or lesions induced by hypertrophy of the heart.

2. Name the general diseases in which pericarditis is apt to occur. Name them as near as you can in the order of its relative frequency of occurrence. Describe the characters of the new material (undation, fluid and solid) which is enclosed in the sac in the various forms of pericarditis.

3. Description of *post-mortem* examination and commentary:—

On the 7th January, 1868, there was an inspection of the body of Private John Williams, who died on the 5th January. He had been ill for two years. He was 35 years old when he died. It is believed he contracted his ailments in the East Indies. He had completed eight years of service, at home from from 22nd December, 1859, to 23rd November, 1863; and in the East Indies from that time till 29th November, 1867, when he arrived at Netley.

He suffered from acute dysentery at Kamptee. On the passage home he became scorbutic.

At home he had previously suffered from primary and secondary syphilis, and his family history told of hereditary phthisis.

He was invalided on account of chronic dysentery, and on admission to Netley he was in a debilitated and scorbutic state, with symptoms of chronic dysentery. A systolic bruit was detected at the apex of the heart.

On the 16th December he complained of difficulty of breathing. On the 20th he became very weak and feverish, and expectorated blood-tinged sputa. Latterly the pneumonic symptoms declined. On the 1st January his condition was that of extreme exhaustion, with dullness on percussion over a large area, bronchial breathing and bronchophony; no cough, nor expectoration. There were bed-sores. On the 2nd and 3rd he passed blood *per anum*, the loss of blood being preceded by marked lowering of temperature.

On the 5th January his respiration became spasmodic; pulse 86, weak and irregular; abdomen tympanitic. Temperature, 87° Fahr. Passing blood *per anum*, and from nose. Large mucous rôle over chest. Became comatose, and died at 10·30 P.M.

Describe the condition of—

(*a*) the lungs;
(*b*) the pericardium;
(*c*) the heart; giving the measurements of it, and of its orifices;
(*d*) the colon;
(*e*) the liver, spleen, and kidneys; and

conclude with a pathological summary on the whole case.

III.—Military Surgery.

1. Enumerate the various articles of equipment which are placed at the disposal of Army Surgeons to asssist them in the execution of their professional duties when they accompany troops on active service.

Give a sketch of the system on which the equipment, as a whole, has been arranged, and indicate the special objects of the articles severally.

2. What are the principal sources of danger when the knee-joint has been penetrated by a bullet?

Describe the various modes of treating these wounds which have been had recourse to in recent wars, and the general results of the experience which has been thus gained.

Mention also the results of amputation at the knee-joint in the French and English armies in the Crimea, and in the northern armies during the war of the rebellion in the United States of North America.

3. What quality of vision is necessary to enable a soldier to become a good marksman at all the distances for which the rifle can be adjusted?

How do you diagnose and estimate defects of vision, pathological changes being excluded, which unfit a soldier for becoming a good marksman?

IV.—Military Medicine.

Give a brief summary of the rise and progress of cholera from the year 1817 to the present time.

How does the propagation of the disease appear to be affected—

(*a*) by temperature;
(*b*) by rainfall;
(*c*) by excessive dryness;
(*d*) by the wind;
(*e*) by elevation above the sea level;
(*f*) by the agency of water; and
(*g*) by excessive fatigue, as in the course of long marches?

Give the best account you can of the so-called "cholera fungus," more especially with reference to Professor Hallier's experiments and conclusions.

2. What is the most usual premonitory symptom of cholera?

How long should this symptom last to bring it within the proper signification of the term "premonitory"?

Describe the symptoms of a well marked case of cholera, in the order of their occurrence, distinguishing the stages.

What is Dr. Johnson's theory of the stage of collapse, and by what arguments is that theory supported?

What is the temperature of the surface, and what that in the rectum in the algide stage?

Describe the intestinal discharges in cholera.

What is the prognostic significance of bloody evacuations?

What are the chief dangers in the stage of reaction?

3. What is the first and most essential measure to be taken when cholera attacks a regiment—

(*a*) in barracks;
(*b*) on the line of march in India?

How are the evacuations of the sick to be dealt with?

Give to the best of your knowledge the therapeutic value of—

(*a*) Purgatives;
(*b*) astringents;
(*c*) opium;
(*d*) stimulants; and
(*e*) saline injections, in the treatment of the disease.

B. Practical Examination.

Military Medicine and Surgery.

Examine the case of . . . .

Write, concisely, a history of the case, your diagnosis, prognosis, the probable effects of treatment, and the influence of the disease (or injury) on the man's fitness for service as a soldier.

Military Hygiene.

1. Examination of water—
   (*a*) Physical examination.
   (*b*) Qualitative and (*c*) quantitative determination of amount of chlorine, sulphuric acid, and hardness—total, permanent, and removable.
2. Reading of barometer, with corrections.
3. Microscopic examination of specimens of starches.

1. Examination of water for organic matter.
2. Determination of acidity in a specimen of limejuice.
3. Microscopic examination of starch.

PATHOLOGY.

1. Describe the five morbid specimens indicated by the letters A, B, C, D, E, and in your description state—
   (*a*) The name and exact limits of the parts embraced in each specimen.
   (*b*) The lesions shown by each specimen.
   (*c*) The probable effects of the lesions shown by each.
   (*d*) The probable causes of the lesions.
2. Examine microscopically the portions of texture given for examination. Name the organ of which each is a portion, and describe its morbid condition.
3. Name the objects shown under the microscopes, numbered respectively 1, 2, 3, 4, 5, and 6.

SIXTEENTH SESSION.—SUMMER, 1868.

COMBINED RESULTS of the Chelsea Examination in February 1868, and of the Netley Examination in August 1868.

NAMES of Candidates for the British Medical Service, arranged in Order of Merit, with the Total Number of Marks.

Order of Merit, as finally settled.	Names arranged in Order of Merit for both Examinations.	Total Number of Marks. (Maximum, 6,900.)	Order of Merit as finally settled.	Names arranged in Order of Merit for both Examinations.	Total Number of Marks. (Maximum, 6,900).
1	Lewis, T.	5,452	20	Craig, R. M.	3,423
2	Dobson, G. E.....	4,855	21	Rahilly, J. R.	3,362
3	Fraser, J.	4,563	22	Brown, A. L.	3,310
4	Williamson, N. A.	4,375	23	Macrobin, A. A...	3,281
5	Walker, J.	4,295	24	Waghorn, F.	3,175
6	Ryan, G. W.	4,177	25	Jennings, C. B. ..	3,155
7	MacSwiney, E. N.	4,170	26	Garde, W. H.....	3,073
8	Conyers, J. S.....	4,155	27	Reynolds, J. H. ..	2,950
9	Fitzgerald, R. G. .	4,137	28	Burford, H. H. ..	2,915
10	Ussher, J. H.	4,008	29	Jackson, T. W....	2,913
11	Leader, J.	3,980	30	Thornton, D.	2,910
12	O'Brien, J. A. G..	3,976	31	Latchford, J.	2,775
13	Gasteen, W. C. ..	3,963	32	L'Estrange, P. W.	2,732
14	Anderson, R. F...	3,910	33	Frazer, P. F.....	2,688
15	Geoghegan, W. ..	3,825	34	Campbell, W. G. .	2,670
16	L'Estrange, A. H..	3,627	35	Samuels, W, F....	2,614
17	Kirwan, A.....	3,607	36	L'Estrange, F. A..	2,454
18	Jones, C. E.....	3,503	37	Eager, O. S.....	2,428
19	Knox, J. M.....	3,460	38	Parke, Duke.....	2,379

NAMES of Candidates for the Indian Medical Service, arranged in the Order of Merit, with the Total Number of Marks.

Order of Merit.	Names arranged in Order of Merit for both Examinations.	Total Number of Marks. (Maximum, 6,900.)	Order of Merit.	Names arranged in Order of Merit for both Examinations.	Total Number of Marks. (Maximum, 6,900.)
1	Cunningham, D.D.	5,945	11	Monteith, J. J.	3,698
2	Whitwell, H.	5,550	12	Roche, J. J.	3,676
3	Cameron, A.....	4,790	13	Stevens, R. H. ...	3,667
4	Evers, B.....	4,245	14	Martin, P. R.	3,430
5	Carmichael, A.C.G.	4,240	15	MacDermott, P. J.	3,425
6	Harvey, W.....	3,975	16	Dalgairns, A. E...	3,367
7	Grant, A. G.....	3,925	17	Mookeye, R. N...	3,355
8	Hay, G. W. R. ...		18	McArthur, A.....	3,230
9	Jackson, W.	3,915	19	Fitzpatrick, J. F..	3,174
10	McLaren, G. G...	3,890	20	Archdale, H. M. D.	3,125
For Service on the West Coast of Africa.—In Netley only.					
1	S.A.S. Harvey, C.H.	2,005	2	S.A.S. Heather, D.D.	1,337

CHELSEA EXAMINATION, FEBRUARY 1868.

ANATOMY AND PHYSIOLOGY.

1. Enumerate the ganglia situated about the head and face (not neck), and describe their relations and connection with the various nerves.

2. Give a full description of the palate bone, and its relation to the surrounding parts—blood-vessels, nerves, &c.

3. Describe the fœtal circulation, and the formation and structure of the placenta, and the mode of its connection with the uterus.

4. Describe the parts contained in the space bounded by four lines corresponding to the borders of the masseter muscle, as exposed in dissection from the surface inwards to the mesial plane.

5. What is meant by "reflex" action, as applied to the nervous system? And give instances of the various phenomena assigned to it.

6. What is the average inspiratory capacity of a healthy man, about 5 feet 10 inches in height? And state under what circumstances, and under what conditions of age, sex, stature, or configuration of the chest, the capacity of the thorax may be increased or diminished.

SURGERY.

1. Describe the local and general symptoms of an abscess forming in bone. In which bones, and in what portions of them, is abscess usually found? What treatment should be adopted when one is suspected to exist? And what would be the result if treatment be neglected?

2. State the symptoms and appearances which enable a surgeon to distinguish a case of cataract from one of glaucoma.

3. Describe the symptoms, local and general, of a case of strangulated femoral hernia. Describe the operation for its relief, and the subsequent treatment of the patient.

4. A boy was carrying a short sharp-pointed knife, in a case in his pocket; the knife slipped out of the case, and by accident was thrust into the inner part of the thigh, about its middle third. Arterial hæmorrhage followed the withdrawal of the knife, but was arrested by pressure. It recurred in a few hours, and there was now a large swelling under the skin and around the wound. Under such circumstances, what would be the diagnosis, and the treatment to be pursued

5. Describe the symptoms of dislocation of the head of the femur into the obturator foramen, and the measures to be adopted for its reduction.

6. Describe the symptoms and progress of a case of senile gangrene, its treatment, and the pathological conditions observed after death.

Medicine.

1. Enumerate the forms of paralysis described by systematic writers, and describe the symptoms and the morbid anatomy of cases of paralysis caused by disease in any part of the cerebrum.

2. What are the causes of ulceration of the larynx? How would you examine the throat, and what would be the physical signs in the lungs in cases in which there was concomitant pulmonary disease?

3. Mention the chief reasons for which the urine is examined, and state how you would detect abnormal substances, either in solution or suspension.

4. Describe a case of severe scarlet fever, and give the treatment.

5. What are the chief anthelmintics, and what are the entozoa which can live in the alimentary canal of man?

6. What are the symptoms and pathology of phlegmasia dolens?

Natural History, &c.

1. Give the botanical characters of the fruits of the following plants:—Plum, rose, strawberry, raspberry, apple.

2. What are the distinctive characters of the ascending and descending axis of plants?

3. What families of plants yield a milky juice? In what families may this juice be expected to be innocuous, and in what cases poisonous?

4. Define and distinguish from each other gum, gum resin, resin, fixed oil, volatile oil. Give examples of each, and say of what orders of plants each is characteristic.

5. Describe the development of a moss from the spore to the maturity of the theca.

6. What are the products of decomposition in plants and animals respectively?

7. How do you distinguish plants from animals?

8. Describe the principal modifications of the respiratory apparatus in birds, reptiles, batrachians, and fishes.

9. Give an account of Mr. Darwin's theory of natural selection.

10. Describe the microscopic structure of bone, and state how you could distinguish (microscopically) from each other the bone of a mammal, a bird, and a reptile.

11. What are the characters of cephalopods? Distinguish them from other molluscs.

12. Describe vinous and acetous fermentation.

13. What is the meaning of radiant heat? and what are the relative radiating powers of different bodies?

14. What is the chemical composition of water? What are its physical properties? How do hard and soft water differ? What are the contents of sea water?

15. Explain the principle of the barometer, and state why it has a tendency to rise in fine, and fall in bad weather.

16. What is coal? In what strata is it chiefly found? Of what plants does it chiefly consist?

NETLEY EXAMINATION.

A. Written Examination.

I.—Pathology.

1. (*a*) Explain the meaning of degeneration of tissue.
   (*b*) Enumerate the degenerations which have been described.
   (*c*) Describe the anatomical characters of each of them, and how each of them may be recognized in the organs after death.

2. (*a*) Describe the typical phenomena characteristic of obstruction of the intestine.
(*b*) Explain how fæcal vomiting occurs.
(*c*) Mention the chief varieties of intestinal obstruction (exclusive of hernia) in the order of relative frequency.

3. Corporal James Blakeley was admitted on the 8th of May, 1866, into the Royal Victoria Hospital, and died on the 12th of May. The post-mortem examination was made on the following day. He was 36 years of age, and had completed 23 years of service, chiefly in India. He contracted syphilis in India in 1848, again in 1859, but did not suffer from secondary disease till 1865. During the hot season of that year he suffered from onychia of the right great toe, which required removal of the nail. In September 1867, he came under treatment for *chronic hepatitis* and *secondary syphilis*. In October he was again admitted to hospital with a sore on the *glans penis*, which resisted all treatment, and spread gradually until the penis was destroyed to its base. He was a man of very intemperate habits, and had been ill 232 days. On admission to Netley Hospital he was in an exceedingly scorbutic and debilitated condition, having been three months on the voyage, and on salt rations. The gums were spongy and apt to bleed, emaciation was very excessive, diarrhœa constant, the motions involuntary, and to the extent of 12 or 14 daily, of a most offensive nature. There was loss of power of limbs, and the lower extremeties were œdematous. Extensive ragged ulcerations surrounded the remains of the penis at its base, There were bedsores. The nose was flattened, the throat affected. Two days after admission he was seized with severe cough and difficulty of expectoration, and in two more days he died.

1. Describe the condition of the scalp and skin over the extremities; also of the thyroid gland, the larynx and the lungs. The lungs weighed 3 lbs. 13 ozs.

2. Describe the condition of the heart and aorta, and of the mucous membrane of the intestines.

3. Describe the condition of liver and kidneys.

4. Name the bones which were diseased, and describe their condition.

5. Give a summary, distinguishing the lesions you consider due to syphilis from those you consider due to the scorbutic state.

II.—Military Hygiene.

1. When an officer reports that a body of troops is placed in "bad sanitary conditions," what is the meaning he attaches to the phrase?

State what you would consider to be "good sanitary conditions" for troops serving at home.

Enter at length into the question of the removal of the liquid and solid excreta from dwellings.

2. Give a short general account of the sanitary conditions affecting white soldiers serving at Gibraltar, Jamaica, and the Mauritius; and state briefly the chief diseases at these stations.

3. What are the chief causes which give rise to sickness and mortality in time of war? State briefly the chief measures you would advise for the prevention of the diseases you name.

III. Military Surgery.

1. Mention the principal varieties of gunshot wounds of the abdomen that are liable to be met with in battle. Describe the treatment to be followed in each variety.

2. State what you know about the *direct* and *indirect* methods of examining the eye by the ophthalmoscope. Particularly mention how the two methods of examination are conducted, and the effects of each as regards the appearance presented to the observer.

3. Describe systematically the examination of a recruit.

IV.—Military Medicine.

1. (*a*) Give roughly the altitudinal and horizontal ranges of yellow fever with such exceptions to the general rule as you may remember.

(*b*) What temperature appears to be essential for the propagation of the disease in an epidemic form?

(*c*) Within the yellow fever zone, is the coming of an epidemic of that disease, even preceded by an exceptional state of health of the inhabitants? If so, describe what has been observed, and give any examples you may happen to remember.

(*d*) Give briefly your opinion on the contagiousness or otherwise of the disease, and any facts you may remember bearing on its propagation.

(*e*) With what diseases is yellow fever apt to be confounded? Give the leading points of diagnosis.

(*f*) Does yellow fever present any varieties? if so, name them.

(*g*) What are the leading and distinctive symptoms of the disease?

(*h*) Yellow fever having appeared in any city, garrison, or station, in which your regiment may be quartered, give briefly the recommendations you would address to the officer in command to insure as far as possible the safety of the troops.

2. (*a*) By what term is sunstroke designated in the official classification of diseases?

(*b*) Does this affection happen only in the direct rays of the sun? If not, under what other circumstances do we meet with it in hot climates?

(*c*) What appear to be the most powerful predisposing causes of the disease?

(*d*) For what diseases is it often mistaken? Give the leading points of diagnosis.

(*e*) What are the most frequent sequels of sunstroke?

(*f*) Give (1) the premonitory, (2) the actual symptoms of the disease

(*g*) Describe the best means of prevention and treatment.

3. (*a*) What appear to be the most common causes of epilepsy and epileptiform convulsions in the Army?

(*b*) How do you distinguish between true and feigned epilepsy?

(*c*) What do you understand by the terms "Status epilepticus"? What by "*Haut Mal*," and "*Petit Mal*"?

(*d*) What are the steps you would take before sending a soldier before an invaliding board as a confirmed epileptic?

(*e*) Describe the leading principles of treatment in this disease.

B. Practical Examination.

Military Hygiene.

1. Examine the specimen of water given for physical, qualitative, and quantitative analysis, as much as can be done in the time.

2. Determine the amount of carbonic acid of the air in the jar, in volumes per 1,000 (corrected for temperature).

3. *Microscopic.*—State the contents of the packet.

1. Examine the specimen of water given, for physical, qualitative and quantitative analysis.

2. Read the standard barometer, and apply the correction for temperature

3. Determine the total acidity of wine.

4. *Microscopic.*—Examination of adulterated starches.

Pathology.

1. Examine the portions of tissue placed in the dishes. State of what organ each is a part, and describe its morbid condition.

2. Describe the lesions shown in the preparations numbered respectively 1, 2, 3, 4. State what parts are shown in the preparations; describe the lesion or lesions which are illustrated, and the probable stage of the disease to which each corresponds.

3. Determine the magnifying power of any one of the microscopes, and append the scale used.

THE ALEXANDER MEMORIAL.

It was determined by the Executive Committee last year—

1. That out of the interest of the amount now invested, a medal to be called the Alexander Medal, and to be of not less value than 5*l.*, and a purse containing 50*l.*, be awarded, once in every three years, to the executive Medical Officer, on full pay, who shall write the best essay on a subject to be selected by the executive Committee, and to be competed for under the following conditions:—

2. The selection of subjects to be confined to—

Military Medicine.
" Surgery.
" Hygiene.

3. The first subject selected for competition to be announced as soon as possible, and the essays to be completed and dispatched by the writers to "The President of the Alexander Memorial Fund Committee, 6, Whitehall Yard," on or before the 31st December, 1869.

4. Each essay to be clearly and legibly written, superscribed with a motto, and accompanied by a sealed envelope similarly superscribed, and containing the name of the writer.

5. The relative merits of the essays to be determined by assessors, to be selected by the Executive Committee.

6. The prize to be invariably awarded to the best essay offered, without reference to the number of competitors, provided the writer has complied with the prescribed conditions.

7. The subject for the first competition to be—

> "The ætiology and prevalence of diseases of the heart among soldiers, as compared with the civil population of those countries in which they are called upon to serve, and the means of prevention or mitigation,—due regard being had to the conditions in which the soldier is unavoidably placed."

APPENDIX No. LIX.

A SHORT ACCOUNT OF THE ORIGIN AND PROGRESS OF THE ARMY MEDICO-CHIRURGICAL SOCIETY OF PORTSMOUTH.

On February 5th, 1868, a meeting of Army Medical Officers took place at the Garrison Hospital, Portsmouth (Dr. Gordon, C.B., Deputy Inspector-General, in the chair), for the purpose of discussing the practicability of instituting a society, having for its object the offering of facilities for professional communication between the members, and the interchange of views on questions of military medicine, surgery, and hygiene; also with a view of giving access to the leading medical periodicals, &c., by means of a library and reading-room.

A Committee having been appointed, they proceeded to draw up a series of propositions having these objects in view.

The Director-General having been made acquainted with the objects of the society, expressed his approval, and kindly consented to become its patron, offering at the same time all the encouragement and support in his power.

Sir George Buller, K.C.B., commanding the south-west district, consented to be present at the inaugural meeting, held at the Garrison Hospital, March 11th, 1868.

The address was read by Dr. Gordon, and the steps by which the Army Medical Officer has risen to his present responsible position were shown; he pointed out the many and great improvements which have taken place in surgery, and in the condition of the soldier through the suggestions of different Army Medical Officers, and mentioned the names of the more eminent Army Surgeons, with the services performed by them, bringing the period down to that of John Hunter, whom he justly states to be the father of so many improvements that to enumerate them would be to discuss the whole circle of medical science. He closed the long list of Army Surgeons with the name of Sir James McGrigor, giving his many services with the Peninsular Army, and mentioning the high estimation in which he was held by the Duke of Wellington, and the good will and hearty co-operation which resulted from his manner of conducting the duties with the Medical Officers under him.

At the conclusion of Dr. Gordon's address, Sir C. Buller, K.C.B., expressed his warm approval of the establishment of such a society, and was surprised that a want which must have been so long felt in a large garrison like this was never before supplied.

Since the society has commenced its regular meetings, several very interesting papers have been read. A very complete account of the recent outbreak of a peculiar kind of fever at the 11th Depôt Battalion, Gosport, by Staff-Surgeon Cullen, has been read before the society by the author on April 1st.

Dr. Cullen, after recounting the outbreaks of disease, variously named as malignant purpuric fever, ceribro-spinal meningitis, &c., which have occurred within the last few years in different parts of Europe and America, proceeded to describe the chief characteristics of the disease. Dr. Cullen then gave a detailed history of the cases as they presented themselves. The first case occurring on February 14th, resembled in every respect those described by authors as cerebro-spinal arachnitis; the case terminated fatally on the second day, and at the *post-mortem* examination the body was found to be covered with purpuric patches. Pus was found spread over the surface of the arachnoid membrane along the vertex, and also at the base of the brain. The patient was first treated with hyd. c. creta and James' powder, five grains of each every two hours; he improved apparently after being freely purged, until

the night, when the cerebral symptoms became aggravated, and soon caused his death.

The second case occurred on February 15th; the symptoms were chiefly of a cerebral nature; the pulse was slow and intermittent. Rapid improvement took place when the gums became affected by mercury. Hyd. c. creta, with small doses of quinine and James' powder being given. The third case, occurred on the 15th also. The onset of the disease was marked by gastro-enteric disturbance, and great depression of the nervous system, almost amounting to collapse. There was considerable headache and pain at the nape of the neck; reddish-coloured blotches were observed on the skin; reaction occurred on the second day, and the pulse went up to 120. A blister was applied to the head, and he was put under the influence of mercury by means of calomel, small doses of quinine being combined with it. The cerebral symptoms abated when the gums became spongy, but retraction of the head and intermittent headache continued for some time. He had two relapses, but eventually recovered.

The fourth case, like the preceding one, presented nearly all the symptoms common to those cases described as cerebro-spinal meningitis; the petechial spots, however, were not well marked, but there was the gastro-enteric disturbance, followed by signs of cerebro-spinal irritation, viz., delirium, headache, dilated pupils, retraction of the head, muscular pains, and herpetic eruption upon the lips; also there was a well-marked tendency to relapse.

Eighteen cases in all occurred, some being of a mild character; but in those that were of a severe type there was no mistaking the character of the disease.

The cases occurred in strong healthy recruits, and all, with one exception, came from the same locality in barracks, near to which was a choked drain, filled with black mud. The amount of cubic space per man (550 feet) in barracks was too small, considering the construction of the building.

In the discussion which followed the reading of Dr. Cullen's paper, Dr. Elliott, late of the Royal Navy, expressed his surprise at the absence of fever amongst the civil population, considering the bad state of the town drainage. He thought the disease under discussion identical with that which had been described by Dr. Roupell, of London, 1837 or 1838, under the name of rubeolar fever.

Dr. Norman thought the disease to be typhus of a very low type, and was struck by the exhibition of mercury. He should feel inclined to try quinine alone, omitting the calomel.

Dr. Gordon was also unable to explain the rationale of the treatment adopted, but was satisfied with the result, which was much more successful than that which had been obtained by others. Dr. Gordon was particularly struck by the retraction of the head in Dr. Cullen's cases, and also by the fact of the disease attacking recruits.

At the same meeting, Dr. Maunsell, R.A., read an account of two cases of aneurism.

Case 1.—Serjeant-Major M'Farlane, æt. 37, of temperate habits, was admitted to hospital March 11, suffering from ascites of cardiac origin. As he suffered from considerable dyspepsia from the upward pressure of the great collection of fluid in the abdomen, and had been under treatment for the same affection on several former occasions, it was deemed necessary to perform paracentesis ab. This was done on the 17th, and was followed by great relief. On the 19th it was repeated, and he went on favourably till the 23rd, when peritonitis set in, and he died on the 24th.

From the first symptoms of cardiac affection we must trace his history back to November 1867. He was in hospital with mitral and aortic valvular disease, and was in hospital about six weeks. He afterwards suffered from swelling of the legs and ascites. He did light duty, and did not much complain of his ailments.

On being admitted on 17th of March there was extensive cardiac dulness. Heart sounds strong, rapid, and regular; pulse at wrist, weak—85; jugular vein distended, and pulsating synchrously, with the heart systole. A loud systolic murmur was heard over the base of the heart, and on the course of the great vessels it completely obscured all the other sounds. We had still no

reason to suppose that he suffered from any complication other than that already described, with the exception of dilatation of the right cavities, which we might expect from such long-standing disease (aortic and mitral). The sudden death, however, and the *post-mortem* examination, disclosed an amount of disease for which we were unprepared. On raising the sternum we found a tumour as large as an orange. It appeared to occupy the position usually held by the pulmonary artery, and at first sight appeared to be that vessel greatly dilated. We found also the heart greatly hypertrophied and dilated, weighing 28 ounces. On examining the tumour we find that it is an aneurism of the ascending aorta, which has overlapped the pulmonary artery, completely concealing and compressing it. The aneurism measures 12 inches in circumference, and as many as six layers of coagula lined it like the layers of an onion. It extended from the origin of the aorta to commencement of descending aorta, and forming a regular pouch, from the convexity of that vessel. Several atheromatous patches existed on the inner coat of the vessel.

Case 2.—Gunner James Kelly, æt. 32, of temperate habits, was admitted to hospital March 12, stating that he fell down stairs in December last, and hurt his right shoulder. He continued to do his duty some time, when he began to complain of difficulty of breathing, giddiness, and pain in the chest at top of sternum. On examination he was found to suffer from the symptoms of aneurism of thoracic aorta. Behind the first bone of sternum there was a clear double sound, distinct from that of the heart, and louder; no break was heard; the sounds were carried up to the right clavicle; there was a thrill communicated to the hand when applied to the sternum; all the superficial veins of the upper part of thorax were very tortuous and dilated; the external papalors full and pulsating; his countenance was anxious and contorted; there was great difficulty of breathing; the respiration was equal in both lungs; there was marked tracheal stridor, and considerable dysphagia, relieved by his lying on left hip; there was complete absence of pulse in right radial and subclavian artery, and also in right carotid and temporal; the respiratory sound over trachea was loud and sonorous, evidently from pressure on the tube; the tone of his voice was also considerably changed from what it used to be; the right arm was of normal temperature; the functions of the brain were in no way altered from want of blood.

Since admission he suffered from several attacks of bronchitis acuta, which have weakened him greatly. There is also evidence of deposit of tubercle in both lungs, at apex.

About April 12 he was again attacked with bronchitis; both lungs became extensively engaged; he suffered greatly from dyspnœa, the disease advanced in spite of treatment, and he died on April 23.

On *post-mortem* examination, the bronchial tube and lungs were found almost completely blocked up with the bronchial exudation; there were considerable deposits of tubercle in apex of each lung; the heart was normal in size and openings. A large succulated aneurism was found, commencing about an inch from origin of aorta; it was 12 inches in circumference, and passed upwards (overlapped by lung) and to the right side, compressing the arteria innominata so as to prevent the blood-currents passing along during life to subclavian and carotid. The ascending and transverse parts of each, as far as left subclavian, were included in the aneurism, except about an inch at commencement of aorta. The aneurism was closely adherent in front to first bone of sternum, and had caused absorption of sternal end of right clavicle. There were no well-marked layers of lapula in the aneurism, but some black spongy-looking blood-clots were found. Several atheromatous patches were found in the aorta.

We have here two cases of aortic aneurism situated almost in the same part of aorta. One well marked, given off from the convexity, passing upwards, and stopping the progress of blood supply to the right side of brain and right arm. This patient's disease had been of comparatively short duration, and was attended with distressing symptoms, chiefly from the impediments the tumour caused to respiration and deglutition.

The other was of much longer standing; had no symptoms of aneurism; *purse* was given off from the concavity of aorta, passed downwards like a sac, and overlapped the pulmonary artery to an extent which must have greatly

interfered with the passage of the blood from the right side of the heart during life, and which satisfactorily accounts for the well-marked venous pulse and external dropsical symptoms.

At the meeting held on May the 6th, an interesting case of ulceration of the larynx was read by Assistant-Surgeon Alcock, 35th Regiment. The patient who was its subject died of phthisis pulmonalis, but the symptoms of laryngeal inflammation set in very early in the disease. He had, previous to his illness, been celebrated in the regiment for his great strength and dexterity in gymnastic exercises.

In the conversation which followed the reading of the case, it was observed that a noteworthy circumstance connected with it was, that it indicated that the possession of muscular power was no criterion of the constitutional strength of a man. The question also arose whether, in this case, the vital powers had not been diminished by undue exertions in the gymnasium.

Dr. Mansfield, 34th Regiment, gave a history of three cases of cerebro-spinal meningitis which had recently occurred under his own observation—two of them ended fatally. In the first case there were all the symptoms of inflammation of the membranes of the brain. On the *post-mortem* examination, pus was found spread over the surface of the brain, and the ventricles were also filled with pus. There were also signs of commencing peritonitis; there were no ulcers on the intestines; the purpuric patches on the skin were not present. He died on the ninth day of the disease.

In the second case, the symptoms pointed to acute inflammation of the membranes of the brain. There was much pain in the back and limbs; the patient could not bear to be touched, and screamed out when anyone approached him. He died comatose 12 days after the setting in of the cerebral symptoms; there was no discolouration of the skin. On *post-mortem* examination, recent lymph was found binding the convolutions and the lobes of the brain together; the fluid in the ventricles was increased in quantity, and contained shreds of lymph; the middle portion of the small intestine was studded with ulcers.

The third case showed well-marked purpurous spots on the back and lower extremities. The patient had severe pains in the head, also in the joints; there was much heat of skin, with a full pulse; afterwards vomiting came on, and the pupils became much dilated. He was treated with small doses of calomel and James' powder. A blister was applied to the head, afterwards quinine was given, and a liberal diet.

Dr. M'Donald, R.N., F.R.S., contributed a paper of great value, in which he detailed a case of cerebro-spinal arachnitis which had occurred under his observation, and indicating the respects in which the characters of the disease as observed in it corresponded with those detailed by Dr. Cullen. An interesting discussion followed, in which attention was drawn to the fact that the disease as hitherto observed has been confined to the young soldiers. Some observations were also made on the probable alliance of this disease to that which has been described by Sir John Pringle, as affecting the British troops in the low countries in 1740-42.

At the meeting held on the 3rd June, Surgeon Franklyn, Royal Artillery, read a paper on recruits and recruiting, in which he gives it as his opinion that in the rejection of recruits under existing regulations, too much importance is attached to such disabilities as varicose veins and varicocele, and that even if such men are unfit for infantry work, they might be very serviceable as cavalry or artillery soldiers. He touches on the defective quality of the present worsted stockings issued to soldiers as a cause of straggling on the march. He is of opinion that flat-flooted recruits are as good as any others, and that if the ankle joint is perfect, and the bones not malformed, it is all we can insist on. In cases of morbus cordis, Mr. Franklyn keeps the patient in ignorance of the name of the disease under which he labours, as his experience is, that soldiers make the most of it. He thinks the abuse of tobacco a frequent cause of temporary palpitation of the heart in recruits. He thinks little objection lies against loss of teeth and ringworm as causes of rejection. Dr. Franklyn is not clear as to the vision of recruits being tested by the regulation dots. He thinks the trades of recruits should be considered in choosing the branch of the service to which they shall be sent, and to this end favours recruiting for the general service, and then drafting off the men from a general recruit depôt,

where their capabilities have been learnt. He thinks the meat ration meagre, and that recruits learn to drink to appease their hunger. In conclusion, Dr. Franklyn takes occasion to praise the new knapsack-yoke system, but thinks with the Maha Rajah Runjeet Singh, that the soldier should carry nothing but ammunition, being himself carried into action, and then let loose like a hunting cheetah!

Two interesting chemical cases were brought forward at the same meeting, one by Assistant-Surgeon Parke, of the Royal Artillery, of a soldier who had sustained an extensive lacerated wound of the leg and comminuted fracture of the fibula by the wheel of an artillery waggon passing over the limb. The injury was of so extensive a nature as to have induced Dr. Parke to consider whether the immediate removal of the limb was not desirable. The wound was, however, dressed with diluted carbolic acid, namely, one part of the crystallised acid to 60 of water. Suppuration was avoided, granulation took place favourably, and the man made a perfect and rapid recovery.

The other case was one of homicidal wound of the head and fracture of the skull, by Assistant-Surgeon Maunsell, Royal Artillery. The subject of it was a soldier who was suddenly attacked in the streets, receiving a blow on the upper part of the forehead from a life preserver. Beyond an external wound there was nothing to indicate that serious injury had been inflicted. Six days afterwards he was admitted into hospital. Paralysis subsequently supervened, and after lingering some time, death ensued. The *post-mortem* examination revealed a starred and depressed fracture of the inner table. The outer table was also fractured, but there was no depression.

Two extensive and valuable donations of books have already been made to the library of the society, namely, one by the Director-General of the Army Medical Department, the other by Surgeon-Major Fleming, 4th Dragoon Guards. Staff Assistant-Surgeon Kynsey has also been so good as to present several volumes to the society.

APPENDIX No. LX.

CIRCULARS, GENERAL ORDERS, &c.

HAVING REFERENCE TO THE MEDICAL DEPARTMENT FROM 1ST SEPTEMBER, 1867, TO 31ST AUGUST, 1868.

1st. WAR OFFICE CIRCULARS.

Cholera Belts.

No. 45. No. 7, 1st August, 1867.

Should an outbreak of cholera or other disease at a foreign station render it advisable that cholera belts should be temporarily worn by the troops, the Officer in Command, acting upon the recommendation of the Senior Medical Officer at the Station, may authorise the issue from the Military Stores of two cholera belts to each soldier, upon the understanding that when the Medical Officer considers their continued use unnecessary, the belts shall be returned to the Military Store Officer, who will retain them for re-issue.

A charge of 1*s.* 10*d.* will be made for every cholera belt lost or destroyed, and the same price will be charged by the Military Store Officer for any ordinary issues on repayment.

The store of cholera belts at foreign stations will be kept up in accordance with the instructions contained in the War Office Letter, addressed to Military Store Officers on 6th January, 1866.

Cholera Instructions.

Clause 83. 1st November, 1867.

The instructions printed as an Appendix to this Circular are promulgated for the guidance of medical and other officers of the Army, at a time when there is reason to anticipate an outbreak of cholera, or when it is actually prevalent among the troops.

Instructions.

Officers whose duty it is to see to the health and comfort of the troops are especially required to exercise the utmost vigilance at a time when cholera is prevalent, or when there is reason to believe an outbreak may be expected.

1.—*Measures to be adopted in Anticipation of a threatened Invasion of Epidemic Cholera in Military Stations.*

1. Medical officers will make themselves acquainted with every arrangement of their corps, and the condition of every locality in and about the barracks, in order that they may be in a position to suggest, for the consideration of their Commanding Officers, not only improvements in ordinary matters, but arrangements of a more temporary character, applicable to an exceptional period.

2. Nuisances will be removed, and cleansing enforced outside barracks, and with this view local boards or persons entrusted with powers to remove nuisances will be called upon to put their powers in force.

3. As much space as is practicable will be afforded to each individual in barracks; on this account any existing misappropriations will be restored to their proper use.

Should any alteration be made in the appropriation of rooms in barracks or hospitals that has been sanctioned by the Secretary of State for War, the Barrackmaster or Purveyor will report the alteration to the Secretary of State without delay.

4. Careful attention will be paid to the ventilation of all the barrack buildings by enforcing the full use of the means of ventilation, in keeping open

all apertures intended specially for ventilating purposes, and by calling the attention of the authorities to any structural defects.

5. The instructions laid down in the Queen's Regulations regarding the cleansing and supervision of barrack-rooms will be carefully observed. The floors of the rooms will not be washed in wet weather. The regular airing of bedding and its exposure out of doors in fine weather will be attended to; and if epidemic cholera appears in the country, it will be desirable to cleanse and limewash ceilings and walls of all barracks, hospitals, quarters, and stables. Walls of barracks, &c., that have been recently limewashed will not be limewashed again without the previous sanction of the Secretary of State for War; nor will walls will be limewashed by civil labour without similar authority.

6. All sewers, latrines, urinals, and ashpits will be inspected frequently, and their cleanliness ensured by an efficient system of frequent flushing and cleansing; any accumulation in such places will be scrupulously removed, as it must be borne in mind that during the prevalence of an epidemic it is injudicious to disturb old accumulations. A free use of lime is enjoined.

All drains and sewers connected with barracks or hospitals, not otherwise flushed, will be flushed daily by hose, if there are waterworks, or by pails or tubs of water carried by hand if there is no such source of supply. The volume of water used may vary from five gallons to fifty gallons, according to the cross sectional dimensions, length and gradient of the drain or sewer to be flushed. The water should be poured in suddenly, so as to cause a scour.

Sewers and drains with open outlet ends should have the outlets protected by a flap or valve, to prevent sewer air being blown into the buildings.

7. Every source of water supply will be investigated, and the possibility of contamination, by percolation from sewage or from surface impurities, looked to; an examination will be made of the water, and any such impurity detected in it will at once preclude its use for drinking or cooking purposes.

8. Attention will be directed to the soldiers' rations, and care taken that they never fall below the standard quality; the men will be enjoined to be careful as to what they eat; and the purchase of any articles deemed indigestible or deleterious to health will be discouraged as much as possible.

9. As much variety as possible will be afforded in the cooking of the rations.

10. The canteen will be frequently visited, and its supplies carefully examined.

11. It will be unnecessary for medical officers to recommend any change in the ordinary duties of the men, as long as they are not excessive. They will, however, suggest the advisability of reducing the night duties to the minimum that the necessities of the station will permit, and point out to the Commanding Officer that any duty subjecting the men to wet clothes or wet feet should be avoided when possible. When exposure is unavoidable, the men should be directed to change the wet articles of clothing as speedily as possible.

12. Medical officers will make frequent inquiry as to the existence of diarrhœa amongst the men; and in the event of affections of the bowels being prevalent will enjoin an immediate application to hospital for medicine, not necessarily with the view of the men being detained in hospital.

II.—*Additional Measures to be adopted when the Disease has appeared among the Inhabitants in the Vicinity of a Military Station, or among the Military of the Station.*

13. The occurrence of cholera in places where troops are stationed will be immediately reported to the Director-General by the Principal or Senior Medical Officer, without waiting for its appearance being officially announced by the Local Board of Health.

14. A daily report, as accurate as can be obtained, of the progress of cholera amongst the civil population of places where troops are stationed will also be required from the principal or Senior Medical Officer.

15. The men will be prohibited going into infected districts, and pickets will be placed to prevent them. Under exceptional circumstances it may be

advisable to confine the troops to barracks, and prohibit any but the most necessary intercourse with persons outside.

16. Where there is reason to apprehend that the health of families living out of barracks would be endangered, such families may be brought into barracks, if it be possible to do so without overcrowding. If the season permit they will be encamped, or if there be danger of overcrowding, houses in heathy positions will be hired. Families of men married without leave will not be brought into barracks without special sanction. When the Senior Medical Officer thinks it necessary to bring such families into barracks, he will apply to the Officer Commanding, who will forward his report, with that of the Barrackmaster, to the General Officer Commanding, by whom it will be transmitted with the opinion of the Principal Medical Officer and District Barrackmaster, and his own recommendation, for the consideration of His Royal Highness the Field-Marshal Commanding-in-Chief and the Secretary of State for War. In case of emergency, the General Officer Commanding may order such married people at once into barracks, and apply for covering instead of previous authority; but no expense is to fall on the public without previous authority.

17. Good fires will be provided in the barrack rooms to increase ventilation and to diffuse cheerfulness, which last should be promoted in every way.

The intermediate allowance of fuel will be issued during the summer months, and the winter allowance during the intermediate months, on the weekly certificate of the Principal Medical Officer and Officer Commanding, that from the prevalence of cholera among the troops at the station, or in its vicinity, such increased allowance is necessary.

18. In old and defective barrack or hospital buildings, where there is reason to suspect that injurious emanations proceed from the sewers, at a time when cholera has appeared in the vicinity, and where sinks, waste-water pipes from tanks, or waterclosets communicate direct with such sewers or drains, application will be made to the proper authority to have the drain connection broken externally, so that the drain or sewer may have full means for ventilation into the open air, at a safe distance from and to leeward of the buildings.

19. Disinfectants, such as chloride of lime, preparations of carbolic acid, perchloride of iron, or other approved preparations, will be used twice each day in latrines, urinals, sewers, ash-bins, and other similar places, on certificate of necessity by the Principal Medical Officer. A non-commissioned officer with a fatigue party will be instructed in the performance of this duty, which will be rigorously carried out, and either the Quartermaster or Orderly Officer will be responsible for its execution. Disinfectants will be issued from the Barrack Department on the spot, on the Principal Medical Officer's certificate.

When time permits the Barrackmaster will apply in the usual manner for previous authority before incurring expense for disinfectants; but in case of emergency, he will obtain such a supply as may be necessary for immediate use, and apply for covering authority, and for such further supplies as may be required.

It is to be observed, however, that if barracks are kept in proper sanitary condition, they are the last places in which special disinfectants are required, and disinfectants must never be used as substitutes for cleanliness in barracks. The lavish purchase of disinfectants on the ground that isolated cases of cholera have appeared in the country will not be sanctioned.

The best means of applying the disinfectants are explained at pages 9 and 10.

20. Married men (if out of mess) will each be provided with a ration the same as the single men.

21. The men will be cautioned against intemperance, and every means adopted to repress it; with which view night passes will be prohibited.

22. Tea or coffee will be issued to the men before going on morning or night duties, on a weekly certificate by the Principal Medical Officer that the issue would be beneficial to health; and every man will have his breakfast, if possible, before leaving his barrack-room for parades or other duties.

23. On the occurrence of a case of cholera among the troops, a report will be forwarded by the Senior Medical Officer to the Director-General, and continued daily until further orders.

24. Questions of importance not admitting of delay may be telegraphed to the Director-General by the Principal Medical Officer.

25. On any appearance of cholera in a corps, the troops will be camped out when practicable, provided the season of the year will permit of it; good ground being selected beforehand, and arrangements made by the Quarter-master-General's Department.

26. Health inspections will be made at morning and evening parades, and a daily inspection of every individual attached to the regiment, but the avoidance of all unnecessary alarm cannot be strongly enjoined.

27. Each soldier will be provided with two cholera belts as part of his necessaries. Flannel shirts ought also to be worn.

28. It is very desirable, during the prevalence of cholera, to boil all drinking water, and to filter it through charcoal when a filter is available.

29. The minds of the men will as much as possible be occupied and amused. Every game or employment tending to recreation, or to induce healthy exercise, should be promoted. Occasional marches for short distances into the country, without arms, may be advisable.

30. Diarrhœa will be most carefully attended to during the prevalence of cholera, and non-commissioned officers will be instructed to order all men to hospital whom they may detect suffering from looseness of the bowels. Sentries will be placed in the vicinity of latrines, and men found going twice in quick succession to the rear will be sent to hospital immediately. For the better detection of this usually painless affection, tickets will be provided for the men, and every time a man goes to the rear he will hand one of them to the sentry; but a man not having his ticket will be allowed to pass, and his name will be reported to the orderly Serjeant. A room for observation in hospital will be provided for such men, and their motions treated as in the case of cholera patients. Medicine will be kept prepared for issue to such cases, day and night, and, to avoid delay, a supply will be placed in the hands of non-commissioned officers in barracks to be administered to men while preparing to go to hospital.

31. The place whence a patient is taken from barracks will be thoroughly washed, and if deemed necessary, fumigation will be made by chlorine or nitrous acid gas, in accordance with instructions at pages 9 and 10. When suspicious cases, or cases of cholera, are removed to hospital, their barrack bedding will be taken with them for use in hospital; each such case being reported to the Barrackmaster in order that the bedding may be properly changed.

32. If it be found that any preponderance of cases of cholera or diarrhœa occurs in any building or room, the medical officers will carefully examine the locality, with a view to detecting and remedying if practicable any insanitary condition. The building or room will be vacated, and fumigated with chlorine, nitrous, or sulphurous acid gas. (See instructions at pages 9 and 10.) The walls, ceilings, and floors will be scraped and cleansed, and the two former limewashed before re-occupation.

The fumigation of rooms on account of cholera will be specially conducted under a medical officer with the assistance of the Barrack Department.

33. When cases occur in camp, the ground will, if possible, be changed, as so successfully practised in India; but where this may be impracticable, as will usually be the case at home, the tents should be struck, and the ground cleansed and aired before re-pitching them.

34. If the troops are not camped out, the Regimental Hospital will be appropriated to the treatment of cholera, and the ordinary cases of sickness accommodated in barracks, in rooms set apart and equipped for the purpose; or where this cannot be done, in a hired house. An application for carrying out the latter arrangement will be previously submitted to the Director-General. Should the troops be encamped, all the sick will be treated in tents, the tents for cholera patients being placed in an isolated position.

35. Medical officers will visit their hospitals frequently. They will be required to be always available for any sudden call on their services, and when cholera prevails in the corps, they will not leave the barracks, except under imperative necessity.

36. Cases among the wives and children of soldiers will be treated in the female hospital, where such institutions exist, provided the regiment is not camped out. In stations where there is no female hospital, application will be

made to the proper authorities for a room to be provided for the accommodation of such cases.

37. The women will be warned that if they or their children are attacked with diarrhœa they must at once go to hospital.

38. The patients' barrack bedding will be used in hospital. The Purveyor will provide pailliasses and pillows with straw in the event of a change being requisite. All the hair mattresses and pillows will be removed from the hospital, to equip the rooms set apart for the treatment of the ordinary cases of sickness when cholera attacks the troops.

39. When the barrack bedding is no longer required for use, the straw will be burnt, and the bedding disinfected before being removed from the hospital enclosure, and treated in accordance with paragraph 7, page 40, Medical Regulations (boiling water being used). The foregoing is applicable to hospital sheets, blankets, clothing, and other such articles of hospital equipment as may be used. But such portions of the soldier's kit as cannot be so treated will be exposed to the air and sun, fumigated, and beaten.

40. The stools and vomit will be passed into vessels and deodorized, at once removed, and carefully buried deep at a distance from any source of water supply, or thrown into a latrine set apart for the purpose, which should not for the time being be used for any other purpose. Care will be taken that no other latrine or watercloset is so used.

41. The attendants upon cholera patients will not be taken from this special work to attend on other cases of disease so long as cholera may exist in the barracks or hospital. They will be enjoined to wash their hands well whenever they have been in contact with the discharges of the sick.

42. Corpses will be removed to the dead-house without delay, and buried as soon as possible, but never conveyed to the graveyard on men's shoulders.

43. Post-mortem examinations will be performed in such cases and under such modifications as may be necessary.

III.—*Disinfectants Recommended for Use in Barracks.*

Quick lime, Carbolic acid, Chloride of lime, Common commercial perchloride of iron.

Quick lime, fresh burnt, to be used either in powder, or mixed with water in the proportion of about 12 times its bulk.

Carbolic acid, in the proportion of one gallon of acid to 50 gallons of water, or to 100 gallons of water.

Chloride of lime, mixed with water in the proportion of about a pound to the gallon. Or of the solution ordinarily sold, from a pint and a-half to two pints, in a gallon of water.

The common commercial liquid perchloride of iron, in dilution, with water, in the proportion of one part to 10.

It is considered that any of the foregoing are well adapted for the above purpose; many other disinfectants are also valuable, but the expense of most of them would preclude their use on a large scale.

Solutions of carbolic acid or perchloride of iron are only to be used for sewers, latrines, and urinals after these have been flushed with water.

It is considered that about 100 gallons of a solution of carbolic acid, of the strength given above, would be sufficient for disinfecting purposes in a barrack containing one or two regiments, for a day.

From half to one gallon of the solution of the liquid perchloride of iron, of the strength proposed, would be sufficient for a latrine.

To fumigate a room 60 feet long, 20 wide, and 12 high :—

With Chlorine Gas.

Take common salt	....	4 ozs.
„ Oxide of manganese (in powder)	... ...	1 „
„ Sulphuric acid	....	1 „
„ Water	....	2 „

The water and acid to be mixed together, and then poured over the ingredients in a delf basin, which should be placed in a pipkin of hot sand.

With Nitrous Acid Gas.

Take copper shavings	½ oz.
„ Nitric acid	1½ „
„ Water	1½ „

Pour the acid and water upon the copper, in a small jar.

With Sulphurous Acid Gas.

Burn two ounces of sulphur in a pipkin.

All doors and windows and other openings in the room to be closed before commencing fumigation.

The operator should leave the room immediately the process is begun.

At the expiration of from two to three hours, all doors and windows should be thrown open, and free ventilation established.

Barrack rooms should be entirely emptied before being fumigated.

Sale of Commissions.—Medical Certificates.

Clause 85. 1st December, 1867.

Officers applying for permission to sell their commissions will, if serving with their regiment, be required to produce a certificate from the Medical Officer in charge of the regiment, or, if not so serving, from a military Medical Officer on full or half-pay, not under the rank of surgeon, in which certificate such Medical Officer shall be required to certify, in his own handwriting, that he has carefully examined the applicant, and that he is in a good state of health.

Should the officer not be in good health, the examining Medical Officer should substitute for this certificate a brief description of the disease or disability, adding his opinion as to whether it does or does not threaten early dissolution. In this case a period of six weeks from the date of the application to sell must elapse before the retiring officer shall be entitled to receive the value of his commission, and should he not live so long the sale will be cancelled.

Certificate No. 2, p. 56, Medical Regulations, is hereby cancelled.

Disinfectants.

Clause 92.

In cases of emergency, when a requisition for disinfectants is approved by the Principal Medical Officer of the district, and sanctioned by the General Officer Commanding, they will be immediately supplied by the Barrack Department. An explanation of the circumstances which render the disinfectants necessary will be forwarded by the General Officer Commanding, with an application for the covering authority of the Secretary of State for War for the expenditure incurred.

Charge Pay, Medical Officers.

Clause 25. 1st March, 1868.

Claims from Medical Officers for the charge pay of 5*s.* a day granted by Article 1 of Her Majesty's Warrant of 1st April last (Clause 10, Army Circulars 1867), will in future be supported by a certificate from the General or other Officer Commanding the Troops, that the number of commissioned officers and enlisted men in the command during the period for which charge pay is claimed was 1,500 or more.

Nomenclature of Diseases.

Clause 75. 1st July, 1868.

1. From 1st January, 1869, the nomenclature and classification of diseases which have been prepared by the Royal College of Physicians, will be adopted in the returns of the Army Medical Department.

2. Revised forms of the weekly and quarterly returns are in course of preparation, and will be issued to be taken into use from the above date.

Medical Comforts, Troops on the March.

Clause 76.

It is notified, for the information and guidance of medical officers and purveyors that supplies of medical comforts are not to be issued from the purveyors' stores for the use of troops on the line of march in the United Kingdom.

2. GENERAL ORDERS.

Medical Officers.

No. 93. November 1867.

1. Medical Officers are for the future to be exempted from serving as members of all Boards, except Medical Boards.

Should a medical opinion be required by a Military Board, reference must be made to the Medical Officer, who will furnish his report in writing, or give evidence in person, if thought necessary.

2. Medical Officers having the relative rank of field officer are to provide themselves with chargers and horse furniture, and to appear mounted when required to attend parades.

3. On official occasions, when guests are invited to a mess in the name of the officers of a regiment, the senior combatant officer must always preside: and no second place is to be recognised.

Hospitals.—(*Quartermaster-General.*)

No. 22. 1st March, 1868.

It having been brought to notice that soldiers' wives, who are not on the strength of regiments, have been admitted into hospital, commanding officers are directed not to fill up W. O. Form No. 1,135, on behalf of any soldier's family not entitled,—under the provisions of W. O. Circular No. 819, and paragraph 41 of Army Circulars, clause 50, 1867—to admission into hospital.

Hospital Establishments.

No. 59. 1st July, 1868.

I. The permanent hospital establishment of each regiment of cavalry or battalion of infantry of the line, at home and abroad, is to be as follows, viz.:—

1 non-commissioned officer, as hospital serjeant;

3 privates, as orderlies.

II. Whenever a detachment of more than two troops or companies is detached from head-quarters for duty at an out-station, it is to be accompanied, when practicable, by one of the orderlies above specified.

III. In the Royal Horse, Field, or Garrison Artillery, the permanent hospital establishment is to consist, as at present, of one hospital serjeant for the head-quarters of each brigade, and one orderly for each battery.

IV. The hospital servants for the
Coast Brigade, Royal Artillery,
Depôt ,, ,,
Royal Engineers
Cavalry Depôt,
Depôt Battalions,
Military Train,
and the Departmental Corps,
are to be furnished by the Army Hospital Corps.

Insane Soldiers.

No. 68.

Much inconvenience having resulted from the present mode of dealing with insane soldiers, the following regulations are for the future to be strictly complied with.

An insane soldier, whether at home or abroad, should, under ordinary circumstances, be attended by the medical officer of the corps to which he belongs for one month at least, as the latter, from knowing the probable origin and causes of the attack, is considered the most competent to treat the disease in its earlier stage.

If after such period of treatment the patient should not recover, or, if in consequence of exceptional circumstances which do not admit of delay, it be desirable to remove him, application should be made by the medical officer in charge, to the Director-General, if at home, or to the Principal Medical Officer, if abroad, for permission to transfer the insane soldier to a general military hospital, or to any other establishment in which lunatic wards exist, in which latter case, if it be a private asylum, or other asylum unconnected with the War Department, no order for admission should be given without authority having been previously obtained from the Secretary of State for War.

Such applications should be accompanied by an abstract of the case, drawn up in accordance with the instructions laid down in page 106 of the "Medical Regulations," together with a copy of the soldier's medical history sheet, and a statement of the reasons which induce the medical officer in charge of the case to believe, that if discharged he will not be able to re-enter the service.

On receipt of the documents by the Director-General, if at home, or by the Principal Medical Officer, if abroad, the necessary instructions will be issued for the disposal of the case.

Insane soldiers at home should not be brought before an invaliding medical board, or reported to the military authorities, with a view to removal to a general military hospital, or to an asylum, until the approval of the Director-General, and of the Secretary of State in the latter case, has first been obtained in the manner above directed.

Wages of Hospital Servants on Board Ship.

Clause 82. 1st August, 1868.

1. All claims for wages of hospital servants employed on board vessels conveying troops to this country from abroad will, in future, be settled by the Principal Purveyor at the Royal Victoria Hospital, Netley. Such claims will accordingly be transmitted to the officer in question for adjustment.

2. The claim will be prepared on War Office Form 172, and the names, rank of each man, and the nature and period of employment carefully entered, whether he belong to the permanent Hospital Staff or not.

3. The following information is necessary before any claim can be considered, and will therefore be sent in with it:—

(*a.*) A certificate from the Medical Officer in charge that the servants were actually and necessarily employed in attendance on sick soldiers, an additional certificate being added in the case of special orderlies (in conformity with the rule laid down in Art. 216 of the Purveyors' Regulations), when the orderlies exceed 10 per cent. of the sick in hospital.

(*b.*) A certificate from the Officer Commanding, that the men did not receive free rations during the voyage.

(*c.*) A certificate from the Medical Officer, showing the average number of sick daily under treatment and in hospital during the voyage.

4. In the case of a voyage from this country, the claim will, on the termination of the voyage, be submitted by the Medical Officer in charge, for the approval of the Principal Medical Officer at the Foreign Station.

5. The Principal Medical Officer will, if he approve the claim, forward it to the General or other Officer Commanding to authorise the issue of the amount due.

6. The same information as would be required for the adjustment of claims at Netley (see paragraph 2 and 3 above), will be furnished with the claims at foreign stations.

7. Clause 74 Army Circulars, 1867, is hereby cancelled as far as it relates to acting hospital serjeants and acting or temporary orderlies.

Certificates of Vaccination.

Clause 86.

It has been represented to the Secretary of State for War that the registration of vaccinated children of soldiers is imperfect, in consequence of regimental surgeons omitting to transmit certificates to the district registrars.

Medical Officers of the Army will, therefore, invariably *furnish to* the registrar of the district in which they may be serving a certificate of successful vaccination, as required by the Compulsory Vaccination Act, 26 and 27 Vict., cap. 52, sec. 3.

Precautions in Cases of Infectious Disease at Foreign Stations.

Clause 87.

After the occurrence of a case of yellow fever or other disease of an infectious character in any barrack abroad, the room or quarter in which the case occurred will be disinfected and limewashed. The floors will be well scoured, and the paint well washed with soap and warm water. Before the room or quarter is re-occupied, the windows will be left open for a fortnight, to secure thorough ventilation.

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3. DEPARTMENTAL.

Army Medical Department, 31st August, 1867.

Sir,—It having been represented by the Principal Medical Officer at Netley and Professor Maclean, that the pure, unadulterated wines of France are much better suited for hospital purposes than the wines usually issued; claret having been observed to be especially beneficial in cases of debilitating chronic disease in which patients are often dyspeptic, and have capricious appetites; I have the honour to inform you that the Secretary of State for War has acceded to my request, and approved of the issue of claret as an extra to patients in hospital in such cases as the Medical Officer may consider it suitable; but it is not to be ordered for persons under medical treatment out of hospital.

I have the honour to be,
Sir,
Your obedient Servant,
T. G. Logan, Director-General.

The Principal Medical Officer, &c., &c.

Army Medical Department, 31st March, 1868.

Sir,—I have the honour to inform you that a printed Form of Inspection Report by Principal Medical Officers of the several Divisions and Commands has been prepared (War Office, No. 824), is now ready for issue, and may be obtained from the War Office in the usual manner.

In reporting the result of your inspection, according to this form, it will be unnecessary to enter into the details of sanitary defects requiring the application of remedies, or to do more than refer to representations made on such grounds. The monthly and annual sanitary reports should contain full information on such subjects, and to them only will reference be made for any particulars that may be required respecting them.

I have the honour to be,
Sir,
Your obedient Servant,
T. G. LOGAN, Director-General.

The Principal Medical Officer, &c., &c.

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